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A PROGRAM FOR JAPANESE COASTAL FISHERIES

by

William C. Herrington

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A PROGRAM FOR JAPANESE COASTAL FISHERIES

by
William C. Herrington^{1/}

THE ECONOMIC CRISIS FACING JAPAN'S COASTAL FISHERIES

During the years since the Surrender, some of the principal efforts of Natural Resources Section have been devoted to assisting the Japanese Government and the fishery industry in carrying out a basic rehabilitation program. This program was designed to help the industry increase aquatic production to the maximum level which can be sustained by the resources, in order to meet the requirements of the Japanese people for foodstuffs and industrial materials.

Observations made by members of Natural Resources Section over the past six months indicate that the physical rehabilitation program has been largely accomplished. The fishing fleet has been restored to a total gross tonnage of over 1,185,000, which is somewhat greater than that existing before World War II. Nets and equipment of these vessels generally have been restored to good condition through large imports of cotton and manila for fisheries, particularly in 1948 and 1949. Shore facilities in most cases now are as good or better than before the war.

For Japan Proper, the total catch of all species still is slightly less than that taken before the war because of the continued scarcity of sardines and herring. Excluding sardines and herring, the 1950 production is estimated at 2,580,000 metric tons^{2/} compared to a 1935-39 average of 2,180,000 metric tons. The 1950 production of sardines and herring is estimated at about 960,000 metric tons compared to a 1935-39 average of 1,410,000 metric tons. The decline in catch of sardines and herring is caused by the scarcity of these fish in Japanese waters rather than by decrease in the fishing fleet or fishing effort.

^{1/} The program was prepared by William C. Herrington, Chief, Fisheries Division, Natural Resources Section, and staff members of Fisheries Division, including William C. Neville, Claude M. Adams, Harry W. Yee, and Freeman P. Smith. For details on development of the program in conference with Japanese leaders, see Appendix A.

^{2/} One metric ton equals 1.102 short tons.

Since controls were removed in the spring of 1950 the free market price of fish has decreased to about the 1949 controlled price level. This fact indicates that present production is about adequate for Japanese current demands for food at present price levels. Higher production would lead to increased consumption only through further decreases in the price to the consumer or through market improvement in the quality of fresh and processed fish.

Even though the physical rehabilitation program is about completed, information from the field increasingly shows that the fishermen now are facing a growing economic crisis. The crisis has been caused by the following factors:

(1) The number of fishermen operating in Japan's coastal fisheries now is about 40 percent larger than before the war, as a result of repatriation of fishermen from Japan's colonies and the absorption of unemployed persons from stagnant industries.

(2) Over-all production of fish has not reached the prewar level in spite of the larger number of fishermen and boats. Failure to reach this level is the result of the scarcity of sardines and herring, and in some cases of overfishing and decreased catches caused by too many fishermen and boats. Thus, with about 40 percent more fishermen and a smaller total production, the individual fisherman's share in the catch now is much less than before the war.

(3) The fisherman's operating costs have increased, and in many instances the price of his catch has declined. The drastic rise in the cost of fuel oil, manila fiber, and cotton in the world markets, because of the current world situation, has greatly increased his cost of operations. The decrease in price of fish received by the fisherman since the spring of 1950 has reduced his income. For most coastal fishermen these two movements have wiped out whatever operating margin they enjoyed in 1949.

As a result of these developments, more and more coastal fishermen are unable either to pay off their old loans or to obtain additional credit to finance further operations. Sound financing is impossible under such conditions and production in some fisheries already is beginning to decline. Coastal fishermen in most areas now are facing financial collapse. If this situation is allowed to develop, it will make necessary great outlays of relief funds and will cause serious declines in production. In addition such developments will also seriously threaten the success of the orderly fishery reforms which now are progressing favorably. Recent history graphically demonstrates that absence or failure of needed reform is a sure way to promote social unrest and upheaval.

To meet this crisis, the fishermen's most frequent appeals are for the extension of fishing areas and for more financing. Usually, however, they have not considered these facts:

(1) Japan now has open to it practically all of the areas which were extensively exploited by its fishermen from the home islands before the war, except for the areas in the East China, South China, and Yellow seas and north of Hokkaido. If these areas should be opened to Japan, the fishermen who would directly participate in such fisheries would benefit greatly. This would include 10,000-15,000 fishermen on the 600-700 boats in the trawl fishery of the East China, South China, and Yellow seas and perhaps a considerably greater number of fishermen in northern waters. Such extensions also would greatly benefit the Japanese economy through the additional quantity of fish that would be available for consumption and exports. Thus more lucrative employment would be provided for possibly 25,000 to 50,000 fishermen out of the 1,500,000 to 2,000,000 fishermen engaged in the coastal fisheries. This would be only a small part of the 400,000 to 600,000 increase in number of fishermen which has taken place since the prewar years. Consequently, the conclusion is obvious that although extension of area would be of some assistance to the coastal fishermen it would not solve the critical economic problem which they are facing.

(2) Additional financing, involving more credit and long-range credit, by itself is impractical because most coastal fishermen at present cannot pay their current debts. Under these conditions further loans would only provide an additional burden of interest and payments on principal without producing lasting benefits. On the other hand, a sound financing program would be of much help if preceded and accompanied by other essential measures which would enable the fisherman to operate at a profit so that he could pay off the credit advanced to him.

The growing crisis cannot be solved by rehabilitation efforts. Solution will require a drastic long-range program applying fundamental curative measures. The minimum requirements to meet the crisis are covered in the following Five-Point Program.

A PROGRAM FOR MEETING THE CRISIS

Point 1: Stop further expansion in overfished fisheries and accomplish needed reductions in fishing intensity

The boats and fishermen in many fisheries have increased far beyond the number that can be supported by the resources. Nevertheless, further additions are being made in some types of gear, thus further depleting fisheries upon which far greater numbers of established fishermen already depend for a livelihood.

The situation with respect to small trawlers is particularly critical. In addition to thousands of licensed trawlers, about twice that number of vessels are operating without a trawling license and the number is constantly increasing. Because of the social and economic issues involved, making the needed reduction in number of boats in a single, drastic step does not appear feasible. The following procedure is proposed as a practical method of handling the problem:

a. All trawlers now operating should be placed in one of the following categories:

- (1) Licensed trawlers.
- (2) Boats licensed for other fisheries but operating as trawlers.
- (3) Unlicensed boats operating as trawlers prior to a specified date. This date should in no event be later than 1 November 1950.
- (4) Unlicensed boats beginning trawling operations subsequent to date specified in (3) above.

b. All boats in categories (2) and (3) should immediately be registered as engaged in trawling operations.

c. The trawling fleet should then be reduced to the number which scientific research shows the resources can support. The following procedure is recommended:

(1) All boats without a trawling license or registration certificate (category (4) boats) immediately should be required to cease operating. Continued operation would subject the responsible parties to severe penalties. No compensation or other assistance should be given to the owners or crews of these boats.

(2) A fixed percentage of the registered boats (categories (2) and (3)) should be earmarked each year for withdrawal from the fishery. The specific boats would be designated by the Sea Area committees, by lot or some other equitable procedure, and would be required to leave the fishery within the next six or 12 months. This procedure should be continued until all are eliminated. These fishermen should be given technical assistance to help them relocate in other activities. Credit should be made available under favorable terms, where justified, to help in the relocation program. No compensation would be given to the owners or crews of such boats.

(3) As soon as the categories (2) and (3) boats are eliminated, or sooner if practicable, the same procedure should be applied to the licensed trawlers (category (1)) until the desired reduction in number of boats is achieved. All such trawlers forced to withdraw from the fishery should receive compensation as provided in the Fishery Law^{3/}, or technical and financial assistance as provided in (2) above.

Procedures similar to those recommended for trawling should be applied in other fisheries where overfishing is taking place.

The problem is discussed in greater detail in Appendix B, "Overfishing in the Coastal Fisheries and Proposals for Its Control."

Point 2: Develop sound conservation regulations for the various fisheries

The increase in number of fishermen and boats since the Surrender has increased the fishing in Japan's coastal waters to an intensity never before reached. However, this rise in fishing intensity has not resulted in an over-all increase in catch but has served primarily to divide the available catch among many more fishermen. In some fisheries, particularly those for bottom fish, the results have been even more critical, for the overfishing has resulted in an actual drop in production caused by a growing scarcity of fish. If the present intensity of fishing continues the scarcity of fish and the resulting decrease in production will become more and more acute in the fisheries already affected and will develop in other fisheries.

The fishery resources in some respects are similar to agricultural meat-producing resources. If the farmer kills off his breeding stock, the number of young will be decreased. Furthermore, if he kills his calves, pigs, and lambs while they are young and small, the weight of meat he produces will decline. The same sequence occurs in fishery resources. If overfishing reduces the breeding stock below the optimum level, the average number of young produced declines. If overfishing takes many fish while they are young and small, the stocks of large fish decline. Both of these developments reduce the number and weight of fish on the fishing grounds available to the fishermen each year.

In other respects the fishery resources differ from agriculture. An increase in the number of people working a given farm does not cause an over-all decrease in the productivity of the farm; usually, in fact, production may rise because of more intensive cultivation. Thus although the share of each farmer may be less than before, the over-all production is somewhat larger. In contrast, if too many fishermen exploit a given

3/ Fisheries Law, Law No. 267 of 1949.

area, overfishing actually reduces the productivity of the resources, as pointed out in the preceding paragraph. Consequently the over-all production from the area is lowered. This deprives the consuming public of some of its supply of food as well as further reducing the share of the individual fisherman.

Overfishing and depletion can be prevented or remedied by enforcing properly designed measures for maintaining the productivity of the aquatic resources. Such measures must be based on information obtained through a sound research program which will determine the optimum yield (maximum sustained yield) of the resources and the conditions necessary for maintaining it. Unfortunately, the Japanese Government and Japanese scientists before the war devoted too little attention to this important problem. In the last few years the national government fishery research organization and research program has been reorganized to enable it to provide the information critically needed for maintaining the productivity of the resources. In spite of this advance, owing to the lack of such a program in earlier years Japan is far behind Western countries in this field.

The Japanese Government generally has used limitation on number of boats as the basic method of controlling fishing intensity, but this is by no means the only effective method. Other regulations, such as catch limits, size limits, and mesh size, should be studied to determine their effectiveness and practicability.

Frequent reference is made by many Japanese to use of artificial propagation for restocking Japan's coastal waters and to the use of other measures such as placing obstructions on the bottom to provide refuges, and adding fertilizer to the water to increase the food supply for fish. Such measures may be of value in aquiculture or in restricted inlets. However, many years of experiment never have demonstrated that planting of eggs or young fish in marine waters has measurably increased their productivity. Fertilization of the open waters also has not been practical because of the quantity of materials required and their cost. Protection of the breeding stock and of the young have been the most effective measures for maintaining the productivity of the resources.

Sufficient knowledge now is available to make possible the immediate establishment of some effective conservation measures. These can be extended and improved when additional knowledge is supplied by the newly reorganized research program. This is a continuing process and one which is absolutely essential if the productivity of Japan's aquatic resources is to be maintained.

Further aspects of this problem are discussed in Appendix C, "Research and Conservation Program," and Appendix D, "Some Methods of Fishery Management and Their Usefulness in a Management Program."

Point 3: Establish strong departments in the Fisheries Agency and prefectures for enforcement of fishery regulations

Effective enforcement of fisheries regulations, such as the conservation regulations referred to under Point 2, is essential. At present even those regulations now on the books have very little effect because of almost negligible or ineffective enforcement activities. To improve the situation the establishment of strong fishery regulation enforcement departments in the Fisheries Agency, Ministry of Agriculture and Forestry, and in the prefectural fisheries units is recommended. The sole function of these departments should be to enforce the regulations. This point is discussed in detail in Appendix E, "Enforcement of Regulations."

Point 4: Increase the fishermen's profits

The quantity of fish caught per fisherman is of basic importance in determining his income, but it is by no means the only important factor involved. Other basic factors are the price per kan^{4/} he receives for his catch and the amount it costs him to produce and market it.

a. The price the fisherman receives for his catch will be increased by: (1) improving the quality of the catch; (2) improving processing and preservation facilities and operations; (3) improving distribution and marketing methods. In general fishermen and processors cannot determine the price the public will pay for the catch or the amount it will purchase. These are decided by the law of supply and demand. Nevertheless, the fishermen can influence the public to purchase a large amount and to pay a higher price by improving the quality of the product. Normally, the better the quality the greater will be the demand and increased demand will result in a higher price. Suggestions for improvements along this line are contained in Appendix F, "Technological Developments Which Will Increase Fishermen's Profits."

b. The fishermen's costs will be decreased by:

(1) Improving the business methods and efficiency of his cooperatives and federations so that they can perform purchasing, selling, and other services for him at a lower cost.

(2) Extending and improving the services performed by his cooperatives and federations so that the savings in cost will affect more of his requirements.

4/ One kan equals 8.267 pounds.

(3) Improving the shore facilities to reduce the cost of handling fish. A national long-range program for improving harbor and shore facilities at key localities is essential to avoid wasting of funds and to provide economical operation of facilities.

Costs of producing and marketing the catch are determined partly by the costs of the raw materials used and partly by the costs of processing and distributing the catch. The fisherman can do little about the costs of the raw materials; these are determined by domestic and world markets. Nevertheless, by carrying out the measures recommended above, he can reduce the cost of distributing these materials to the fishermen and handling and distributing the catch. Further suggestions are contained in Appendix G, "Improvement of the Management and Services of Japanese Fisheries Cooperatives," and Appendix H, "Japanese Fisheries Financing and Cooperative Management."

c. An effective extension service should be established to show the fishermen the importance of the measures listed under paragraphs (a) and (b) and how they can be accomplished. Accumulation of the needed information on improving the quality of the catch and decreasing costs will not by itself help the fisherman. He must be taught the importance of such developments and how they can be brought about. Recommendations on this subject are given in Appendix I, "Japanese Fisheries Extension Service Program."

Point 5: Establish a sound financing program

A sound financing program can be undertaken provided the preceding measures are being carried out. Without such measures additional financing will be little more than a relief program which will encourage too many fishermen to continue operations. At the end of one or two years of such financing without other measures, overfishing would be more advanced, the catch per fisherman generally would be less, and the fisherman's inability to pay off the loans would have forced him even deeper into debt.

A sound credit program should provide for the separate handling of self-liquidating financing and relief financing. Regular financing should be on a sound business basis and should include long-term credit at favorable interest rates. In cases when the fisherman already has reached a position where he is unable to handle his present indebtedness, relief financing would be essential. Such financing should be handled separately from the self-liquidating financing and should be administered in such a way as to enable the fisherman subsequently to shift to self-liquidating financing rather than to merely increase his load of indebtedness. Detailed discussion of this problem is contained in Appendix H, and in Appendix J, "Financing the Japanese Fishing Industry."

CONCLUSION

The Five-Point Program will require much careful thought and planning to work out the practical details. It also will require intelligent, honest, and progressive leadership and administration. However, the program must be carried out if Japan's fishing industry is to survive its present crisis. No one of these measures by itself can meet the situation. They must be placed in effect as a single well-coordinated program.

APPENDIX A

DISCUSSION GROUP ASSISTING IN DEVELOPMENT OF FISHERIES PROGRAM

The basic program for meeting the economic crisis facing Japan's coastal fishermen was prepared by William C. Herrington, Chief, and other staff members of Fisheries Division, Natural Resources Section.

The observations and recommendations of Natural Resources Section visiting expert consultants in the field of fisheries were of great value to the discussion group in developing the basic program. Extracts of the official reports of the following visiting experts are included as reference material:

Mr. Howard H. Gordon, Assistant General Manager, Southern States Cooperative, Richmond, Virginia.

Mr. Richard S. Crocker, Chief of Bureau of Marine Fisheries, State of California, San Francisco, California.

Dr. Willis A. Rich, Professor Emeritus, Stanford University, California.

The program was discussed with a group of leaders from the Japanese fishing industry and the Japanese Government in a series of meetings beginning January 13, 1951. The original program was modified and finalized on the basis of these discussions to the form presented in the body of this publication. The facts and conclusions have the general approval of all members of the discussion group. The discussion group included:

W. C. Herrington	Fisheries Division, Natural Resources Section, Chairman
W. C. Neville	Fisheries Division, Natural Resources Section
C. M. Adams	Fisheries Division, Natural Resources Section
H. W. Yoe	Fisheries Division, Natural Resources Section
F. P. Smith	Fisheries Division, Natural Resources Section
T. Kinoshita	Chairman, Fisheries Committee, House of Councillors, Japanese Diet
G. Natsubori	Chairman, Finance Com- mittee, House of Repre- sentatives, Japanese Diet

K. Tominaga	Chairman, Fisheries Committee, House of Representatives, Japanese Diet
Z. Suzuki	Member of Fisheries Committee, House of Representatives, Japanese Diet
S. Nikaido	Member of Fisheries Committee, House of Representatives, Japanese Diet
T. Iiyama	Former Director, Fisheries Agency, Ministry of Agriculture and Forestry, Japanese Government
K. Ando	President, Hokkaido Credit Federation of Fisheries Cooperatives
S. Shichida	President, Nitto Fisheries Co.
K. Kimura	President, Nippon Cold Storage Co.
T. Horibe	President, Japan Fixed Net Fisheries Assn.
H. Sudo	President, Japan Pelagic Trawlers' Assn.
K. Asakai	Councillor of Foreign Office, Japanese Government
T. Hisamune	Liaison Officer, Fisheries Agency, Japanese Government
K. Iesaka	Director, Fisheries Agency, Japanese Government
K. Matsutoya	Director, Administration Department, Fisheries Agency, Japanese Government
M. Fujinaga	Director, Research Department, Fisheries Agency, Japanese Government

APPENDIX B

OVERFISHING IN THE COASTAL FISHERIES AND PROPOSALS FOR ITS CONTROL

by
Harry W. Yoe

February 1951

Japan's coastal fishermen are fast becoming economic victims of their own efforts to contribute to the economic rehabilitation of the nation. This condition is the result of the unprecedented increase in the number of fishermen and operating units since 1945. The total number of fishermen at present is estimated to be about 40 percent greater than in 1941. The number and tonnage of vessels also has shown a large increase and the horsepower of the fleet has almost doubled. The fishing intensity has risen in proportion to the increase in the number of fishermen and boats. This increase began immediately after the cessation of hostilities in 1945 and is still in progress. High fish prices following the Surrender, unemployed industrial workers and demobilized soldiers returning to their home villages, thousands of fishermen repatriated from prewar fishing areas, and a sincere desire on the part of the bona fide fishermen to supply food to a hungry nation, all contributed to the increasing fishing intensity.

As the number of fishermen rose and conditions became more crowded on the fishing grounds, a tendency to ignore fishing laws and regulations became more and more evident. At present, violation of laws and regulations governing licenses, seasons, gear, and similar matters is the rule rather than the exception. This condition has resulted in part from the influx of inexperienced operators into the fishing industry, but the government's indifferent attitude toward the problem is largely responsible for the lack of compliance on the part of the fishermen. During the war and early post-Surrender years, the government's principal objective in the field of fisheries was to increase the aquatic production. This resulted in emphasis being placed on more boats and more gear. No attempt was made to limit the construction of fishing vessels until a press statement was made on the subject by the Chief, Fisheries Division, Natural Resources Section on June 16, 1947. In this statement he pointed out that the tuna and trawler fleets had been restored to tonnages and numbers greater than those existing before the war. In regard to future construction he stated that requests to construct fishing vessels requiring SCAP approval^{1/} would not be considered unless such vessels were for replacement purposes or proof was given the resources of authorized fishing areas would support the additional vessels. As a result of this warning, a greater measure of control was exercised over the

^{1/} Memorandum for the Japanese Government from General Headquarters, Supreme Commander for the Allied Powers, SCAPIN 1148, dated August 22, 1946, Subject: Construction of Steel and Wood Vessels, made it mandatory that SCAP approval be obtained for any construction or conversion of steel vessels or of wooden vessels of more than 100 gross tons. This SCAPIN is still in effect.

construction of steel vessels and wooden vessels of more than 100 gross tons. However, the Japanese Government placed no restrictions on wooden vessels of less than 100 gross tons, nor was any effort made to enforce license laws or regulations governing closed fishing areas, seasons, and other conservation measures. By the spring of 1950 the violations were so numerous that the government apparently felt enforcement was an impossible task. Since then no effective action has been taken by the government or the industry to remedy this situation.

The increase in the number of fishermen and operating units is the principal cause underlying the present economic crisis of the coastal fishing industry. The available catch is being divided among so many producing units that many fishing operations have become financially unsound. Despite the fact that the number of fishermen was about 40 percent greater in 1950 than in the prewar years, the production was slightly less in the corresponding areas. As a result of this increase in the number of fishermen and decrease in the total production, the average 1950 catch per fisherman was only 60 to 70 percent of that of the prewar fisherman. Even before the war the fisherman's profit was very meager, as evidenced by his low standard of living and the large total indebtedness of the fishing industry. When the present reduced catch per fisherman, increased cost of materials, and higher taxes are taken into consideration, it is evident that many fishermen must actually be operating at a loss and will continue to do so until some action is taken to reduce the fishing intensity.

Under the existing conditions, the government and fishing industry must take one of the following courses:

(1) Do nothing. This course will lead to a continued increase in the number of boats and fishermen, resulting in the catch per fisherman becoming even smaller than at present. The eventual outcome can only be complete economic collapse of the fishing industry with the accompanying widespread relief problem and shortage of marine food.

(2) Take immediate steps to bolster the economic condition of the fishing industry through subsidies, government sponsored credit, and other forms of temporary financial assistance. This course will provide some temporary relief but will intensify the basic problem. Even though the collapse may be postponed, it will be more severe when it comes and will require a longer period of recovery. Subsidies will for a time serve to increase the fishing intensity and therefore will accelerate the depletion of parent stock, which will in turn further decrease the catch and income of fishermen.

(3) Take immediate action to prevent any further expansion in the number of boats and fishermen; accompany these measures by enforcement of an organized program for reducing the number of boats and fishermen wherever fishing is known to exist. Such action will increase the catch

per unit of the remaining boats. The fishermen leaving the overfished fisheries can be guided into other activities such as expanded aquiculture operations. If this course is followed, the coastal fisherman can be placed on a sound financial basis by financing, market development, improved utilization, and other programs. Furthermore, more fisheries products can be provided to more people, especially in the inland areas.

The magnitude of the problem makes it economically and socially impractical, if not impossible, to eliminate all of the excessive boats from overfished fisheries at one time. The reduction must be made in successive stages and according to a definite schedule. To achieve the maximum benefit for the industry, the initial effort should be expended on the fishery or fisheries where overfishing is affecting the greatest number of individuals. An analysis of the coastal fisheries indicates that the halting of expansion and subsequent reduction in the small trawler-type fisheries operating east of longitude 130°E will do more to increase the catch of more operating units than any other action that could be taken at this time. The excessive number of trawlers not only compete with each other for the available catch but also compete with the hundreds of thousands of small-scale fishermen engaged in hook-and-line and similar fisheries. Adjustment of the number of small trawlers not only will improve the financial position of the trawlers allowed to continue operations but will prevent small-scale fishermen from being forced out of the fishing industry and becoming a relief problem.

Evidence indicates that the stock of bottom fish is being depleted at present. The following information regarding the current condition of the trawl fisheries east of longitude 130°E leaves little doubt as to why this depletion is taking place:

APPROXIMATE NUMBER OF VESSELS IN TRAWL FISHERIES East of Longitude 130°E

<u>Classification of Vessels</u>	<u>Number</u>
Total number of trawlers east of 130°E	35,000 ^{a/}
Vessels licensed for fishery in which they are engaged	14,000
Vessels licensed for other fisheries but not licensed for trawl fisheries in which they are engaged	9,000
Vessels with no form of license	12,000
Vessels using gear considered injurious to other fisheries and prohibited by ordinance and regulations	1,800

^{a/} Twenty percent of these are vessels of more than 15 tons.

The fact that 60 percent of the trawlers are operating without proper licenses is a striking example of the need for developing and enforcing effective measures to prevent further expansion of the trawler fleet. Some of the other fisheries are equally overcrowded although they do not affect as many fishermen as trawling. These fisheries also should be prevented from expanding further and should be reduced as soon as possible.

The following steps should be taken to prevent further expansion of the trawler fleet:

- (1) Issue temporary operating permits to all unlicensed boats which are to be allowed to operate after a specified date. This will enable enforcement officers to distinguish between unlicensed boats previously operating and those trying to get into the fishery after the specified deadline.
- (2) Utilize existing personnel and facilities to inspect vessels engaging in trawling to insure that no additional unlicensed vessels are placed in operation.
- (3) Establish penalties to be imposed on vessels operating without licenses or operating permits. These penalties should be severe enough to insure that it will be unprofitable to attempt to operate a vessel without such license or permit.

Simultaneously with measures just recommended, the following actions designed to reduce the number of operating trawlers should be taken:

- (1) Establish a licensing system for trawlers which will provide that prefectural governors be responsible for the issuing of licenses for small trawlers whose operation is limited to local waters, and the central government issue licenses for all other trawlers. These two categories must be sharply defined to eliminate overlapping or confusion in licensing authority. This definition can probably best be made by using gross tonnage or length as the determining factor as to who shall issue the license.
- (2) Establish a revised set of trawler regulations designed to prevent over-exploitation of aquatic resources and protect fishermen engaged in other types of fisheries.
- (3) Eliminate as many trawlers from the fleet as is practical at the time of the action recommended in paragraph (1) in the steps recommended to halt further expansion of the trawling fleet. This can best be done by refusing temporary operating permits to the unlicensed trawlers using gear considered detrimental to other fisheries.
- (4) Establish a schedule for eliminating a fixed number of boats from the fleet each year.

(5) Issue licenses for the vessels which are to be allowed to continue in the trawling industry indefinitely and deny licenses to all others.

(6) Give technical guidance to assist the fishermen forced out of the trawl fisheries to become established in fisheries which are not overcrowded or in other fields of employment. Expansion of aquiculture offers one possibility for employment. Financial assistance in the form of credit on reasonable terms might be provided these fishermen for developing new sources of livelihood. When boats legally licensed for the fisheries in which they engage are retired, compensating their owners for the loss of the license should be considered. If hardship cases develop among those individuals forced out of the trawl fisheries, relief should be provided in the same manner as public welfare provides for other segments of the population.

(7) Establish an efficient organization to enforce fisheries laws and regulations. Accomplishment of the needed reduction and prevention of a recurrence of present conditions depends upon rigid enforcement of laws and regulations.

APPENDIX C

RESEARCH AND CONSERVATION PROGRAM

by
Dr. Willis H. Rich^{1/}
Visiting Expert Consultant

January 1951

1. Structure of Japanese Fisheries Research Program

Japanese fisheries research before World War II was devoted very largely to technology and to biological studies designed to increase the effectiveness of fishing. The emphasis was strongly on exploitation, and very little thought or effort was given to conservation or to those biological studies that alone can provide a basis for rational management of fishery resources. The Western nations, on the other hand, long had recognized the need for conservation and had developed principles and methods of research and of regulation that were sound and effective. Of these the Japanese apparently had little knowledge or appreciation. This was due in part to the fact that most of the western literature in the field is comparatively recent, in part to the fact that this literature was scarce in Japan and that much of what was available was in private libraries and not generally accessible to fisheries researchers, and in large part to the fact that comparatively few Japanese can really read the western literature with complete understanding.

With the advice and guidance of Natural Resources Section, the former Bureau of Fisheries in the Japanese central government was modified and expanded into the Fisheries Agency, Ministry of Agriculture and Forestry,^{2/} in order to give the industry a place in the governmental organization which was commensurate with the importance of fisheries to the Japanese economy.

As now organized under a Director and a Deputy Director, the Fisheries Agency consists of three departments. Administration, Production, and Research. The Research Department is, in turn, subdivided into three Sections, the titles and duties of which are as follows:

a. Data and Statistics

- (1) Management of the fisheries and survey of social and economic statistics relative to the fisheries.

1/ Extracts from Natural Resources Section Preliminary Study No. 42, Fisheries Research Program of Japan, Tokyo, January 1951.

2/ Establishment Law of the Fisheries Agency (Law No. 78 of 1948).

- (2) Compilation of basic statistical data for the fisheries and collection, adjustment, safekeeping, and distribution of basic data relative to the fisheries.

b. Biological Research

- (1) Planning and arrangement of researches on resources, propagation, and processing of aquatic products.
- (2) Operation of fisheries research laboratories.
- (3) Collection and distribution of information on fishing conditions.

c. Technological Research

- (1) Popularization of scientific techniques in fisheries.
- (2) Guidance and assistance of fisheries research in the prefectures and lesser political units.

Prior to 1949 all fisheries research of the Japanese central government was concentrated in one main laboratory, the Central Fisheries Experimental Station in Tokyo. With this laboratory were associated three branch stations located in the prefectures of Nagano, Okayama, and Ishikawa and a varying number of temporary stations. Under the new decentralized arrangement eight major regional laboratories^{2/} have been established as follows:

- a. Tokyo (Tokai) Regional Fisheries Research Laboratory, Tokyo.
- b. Freshwater (Tansui) Fisheries Research Laboratory, Tokyo.
- c. Hokkaido (Hokkaido) Regional Fisheries Research Laboratory, Yoichi, Hokkaido.
- d. Northeastern (Tohokukai) Regional Fisheries Research Laboratory, Shiogama, Miyagi Prefecture.
- e. Inland Sea (Naikai) Regional Fisheries Research Laboratory, Hiroshima, Hiroshima Prefecture.
- f. Southern (Nankai) Regional Fisheries Research Laboratory, Kochi, Kochi Prefecture.

2/ In this report the word "laboratory" is applied to these organizations, following a common, although not universal, western custom. A more common Japanese translation into English has been "Fisheries Experiment Institute," but use of the English term most commonly applied to organizations doing similar work in the English-speaking countries seems preferable. The word "station" also could be used.

- g. Western (Seikai) Regional Fisheries Research Laboratory,
Nagasaki, Nagasaki Prefecture.
- h. Japan Sea (Nipponkai) Regional Fisheries Research Laboratory,
Nanao, Ishikawa Prefecture.

The reorganization of the research program under the guidance of Natural Resources Section was designed to speed in Japan the development of research in fishery biology as the western nations know it. The western nations have found that the exploitation of fishery resources, like that of all other biological natural resources, must be carefully controlled if they are to yield at their maximum capacity. Certain well-recognized biological principles must be followed if this "maximum sustained yield" is to be provided and depletion prevented. The research programs of the western nations are planned to provide the information necessary for the application of these principles to individual fisheries. The reorganization plan for Japanese fisheries research is good, and its implementation is going forward as rapidly as could be expected. Most of the Japanese are cooperating fully, and many of them apparently are accepting the changes with real enthusiasm. Improvement undoubtedly would have come eventually under the old system, but its inception would have been much delayed and progress slower.

The establishment of the regional fisheries research laboratories will serve the main purpose of providing much needed leadership and an opportunity for close cooperation in the research work of the prefectures, but the regional system has other important advantages. The researchers come into much closer contact with the problems and learn much of significance to the research work through this contact. One of the most difficult of present fisheries problems in Japan is to obtain more reliable fisheries statistics; methods whereby this can be done can be developed only by research men who know the actual conditions at sea and in the fishing ports and at the same time know the requirements that the data must meet.

Another important advantage in the regional laboratory system lies in the opportunity it provides for a wholesome development of new methods and new ideas. A characteristic of many organizations in Japan, and in some other places, is strong domination by the older members who tend, naturally enough, to be conservative and to follow the lines to which they have become accustomed. This attitude often hinders progress and disappoints and discourages a worker who conceives a new method or a new approach. Of course not all that is old should be replaced by something that is new, but certainly new ideas must be given fair consideration if advances are to be made in any field. By providing the opportunity for this, the new regional laboratories have been amply justified and they should be carefully fostered.

The over-all effect of this reorganization is not to be measured alone by the expansion and the anticipated improvement of the work of the Fisheries Agency itself. The improvements in the program of the Fisheries Agency will be extended into the fishery research programs of the prefectural governments, the fisheries colleges, the departments of fisheries of a number of the universities, and a few private laboratories. A certain amount of cooperation and coordination of the work of these various groups has existed in the past, but the establishment of the eight regional laboratories undoubtedly will do much to further this coordination. On the whole the work of the Fisheries Agency and its predecessor, the Bureau of Fisheries, has been superior to that of the prefectural laboratories. The establishment of the regional laboratories should result in closer contact of Fisheries Agency researchers with the research men of the prefectural laboratories and a consequent improvement of the work done by the latter. The new system enables the Fisheries Agency to serve more effectively as an integrating force as well as an organization actively engaged in research.

2. Nature of Japanese Fisheries Research

In Japan "fisheries research" includes such items as the study of fishing methods, the development and application of new forms of gear, and the study of oceanic conditions in relation to "fishing conditions", to the end that fishing operations can be made more efficient and productive. It includes the development and application of new methods of processing that will aid in the prevention of waste, the fuller utilization of the catch, and the improvement of fishery products both for domestic consumption and for export. It has included exploratory fishing on a grand scale--work that led to the remarkable prewar extension of the Japanese commercial fisheries. This sort of work has accounted for a very large part of the "Fisheries research" of Japan. It has been directed not toward conservation but toward increased exploitation. Such work should have an important place in a program designed to provide maximum use of the fishery resources, but not to the exclusion of those biological studies essential to the preservation of the fishery resources. After all, the fishery industries depend entirely upon the resources.

In a somewhat different category is the work that has led to the development and improvement of culture methods for various fresh water fishes, oysters, clams, edible seaweeds, and the like. Aquiculture ^{4/} frequently requires great skill and knowledge of biological principles. Much of the Japanese research in this field has been of a high order, and the importance of fish culture, speaking broadly, in Japan is so great that its scientific study well deserves the attention it has received. This study comes properly within the scope of fishery biology.

^{4/} This term includes the culture of all kinds of fishery products in both fresh and salt water.

The chief concern in this report is with the work of the Fisheries Agency rather than with that of the other institutions which undertake work in the field of fisheries biology. The governmental agencies are responsible for the maintenance of the resources and, to properly fulfill this responsibility, must have the sort of information that fisheries biology, as it is understood by the western nations, alone can supply. Table A indicates that the Fisheries Agency does considerably more in this field than do the prefectures, and in general the work of the Fisheries Agency is better. This recognition of the importance of biological studies is one reason why the establishment of the several new regional laboratories of the Fisheries Agency will probably do much to improve the status of fisheries biology in Japan.

On the other hand the prefectural institutions have done a great deal in the field of aquiculture. This seems to be entirely sound because fish culture projects usually are small and closely localized, especially when compared with the great sea fisheries.

Since the late 1930's the modern theoretical aspects of fishery biology proper have attracted much attention of Japanese biologists, and many theoretical papers have appeared in the literature. The present tendency, however, seems fortunately to be toward the more realistic aspects of fishery biology. The theories explaining the phenomena occurring in fish populations under exploitation are interesting, but they involve so many assumptions that the direct application of theory to the practical problems of fishery management is seldom justified. They lend themselves to impressive mathematical treatment that, however, seems often to be used to obscure and to mystify rather than to clarify. Theoretical considerations have a place; they are valuable as a background for the study of observed phenomena; but they do not take the place of carefully collected observations and measurements. They are seldom, if ever, useful as a "basis for action".

A few Japanese fisheries researchers have a tendency to use some of the elaborate methods of statistical analysis that have been developed recently. These methods are exceedingly useful in their place, but the assumptions on which they are based must be fulfilled and the data must be sufficiently accurate. Inaccurate data cannot be made to yield reliable conclusions by statistical manipulation. For practical purposes--and fisheries biology is primarily a practical science--a good series of observations, analyzed by relatively simple methods, should always be the first approach.

3. The Problem of Getting Accurate and Adequate Statistics

Fishery biology is predominantly a statistical science. The data are, as much as those of any other scientific discipline, "affected by a multiplicity of causes", and with such data the only sound analysis is that

provided by the methods of statistics. But statistical methods deal almost exclusively with samples, and the accuracy of the sampling is always a matter of primary concern to the statistician.

Ample evidence indicates that most of the past data on Japanese fisheries are neither accurate nor adequate. Data collected at different times or by different agencies may differ widely. Various reasons for this weakness have been advanced, reasons frequently connected with the fear of the fishermen that the data will be used as evidence against them for violation of laws or for imposition of taxes. During the war and the first years after the Surrender, fishermen did not give accurate data, partly because restrictions leveled prices and records of the catch of separate species were not kept, and partly because of the "black market" for fish and fishery products. But the chief reason for the poor statistical data undoubtedly has been the huge size and enormous complexity of the fishing industry. Many of the more important fisheries are widespread, involving various types of gear, great numbers of relatively small boats, and hundreds of thousands of fishermen. The fisheries often take several (sometimes many) species of fish and may, as in the case of the sardine fishery, take fish at all stages in their life histories from larvae to the oldest adults.

The important point is that the statistical system used must be adapted to the fishery in question. Some sort of over-all system should be developed for Japan, perhaps making use of some general features of the California system. To this basic framework the biologists at the various regional laboratories, or those concerned with the study of specific major fisheries, could add items of special importance to their work. Such an arrangement would tend to reduce duplication and consequent waste of effort and also would provide data that would be of great value in later years when other species were brought under investigation. The development of a good fisheries statistical system is of primary importance to Japan's fishing industry, and should be encouraged in every way. In this connection, the Japanese can profit greatly through study of the well-developed systems in use in the western nations and through consultation with Americans and others who have had actual experience in installing and using these systems.

4. Need for Continuing, Long-Term Research Program

In Japan, as in the United States and probably elsewhere, the "practical" fisheries men and the legislators are inclined to be impatient for results--to expect that the fishery biologists can provide within a short time the answers to the many difficult and intricate problems with which they are confronted. But fishery biologists are not magicians, however much some of them would like so to be considered, and such unrealistic expectations should be dispelled so far as may be possible. In general any large fishery requires many years of study before the principles of its sound management can be defined; even then continuous study of what is happening under the management program is essential if the "maximum sustained yield" is to be maintained. A biological natural resource can never

be managed effectively by fits and starts. The process has to be as continuous as life itself. Those who manage fisheries must constantly be in possession of information as to the state of the resources and particularly the effect of past and present activities of man, whether these affect directly or indirectly the resources in question.

Its fisheries mean so much to Japan that the fishery research program should be planned on a long-time basis. Principles may be worked out, but in the care and management of biological natural resources a continuing series of observations is usually necessary. The long-range program, if well designed, will yield an uninterrupted stream of useful information. Often results of great practical value can be obtained from relatively few data, and always decisions based on even a few reliable observations will be better than decisions based on surmise or, worse, on selfish prejudice.

Fishermen, operators, administrators, and legislators must bear in mind that research alone will not result in the desired stability. The results of research only provide the "basis for action"; the action itself is not a function of the research man but must be taken by the administrator responsible for the management of the fisheries. The research man is, properly, the administrator's informed adviser. Furthermore, the men in the industry must unselfishly do their share. Only through the cooperation of the team--researcher, administrator, and fisherman--can the goal be reached.

5. Summary of Recommendations

a. The newly established regional fisheries research laboratories of the Fisheries Agency should be encouraged in every way to become centers of research in their respective regions. They should integrate their work with that of the prefectural laboratories and, so far as practicable, with the research programs of educational institutions and private agencies.

b. Group studies of specific fisheries should be organized and encouraged.

c. The "Income Budget" of the prefectural fishery laboratories should be eliminated. At the least, the basic research projects should be entirely freed from any dependence on funds derived from commercial operations.

d. Cooperation at the international level in the study of the oceanography of the Pacific Ocean and of international fishery resources such as the tuna should be encouraged and supported.

e. Exceptional students in the field of fishery biology should be given an opportunity for training of a broader basis. "In Service" training for the men actively engaged in research should be developed.

f. Library facilities, especially at the regional fishery research laboratories of the Fisheries Agency, should be brought up to date as rapidly as possible.

g. A basic statistical program that will provide fundamental data on catch and effort for all fisheries should be developed. Such a basic program may be supplemented for any specific fishery by the group concerned with the study of that fishery.

h. Research projects in general should be put on a long-time basis.

APPENDIX D

SOME METHODS OF FISHERY MANAGEMENT AND THEIR USEFULNESS IN A MANAGEMENT PROGRAM

by
William C. Herrington 1/

For the last 75 years and more, the coastal peoples of the world have been concerned actively with the problem of maintaining their supplies of fish at a productive level. Despite this concern, only limited progress has been made in solving the problem. Such progress has been limited partly by the difficulty in overcoming the long and widely held belief that the resources of the sea are inexhaustible and therefore cannot be affected by the activities of man 2/, and partly by the lack of

- 1/ Extract from Special Scientific Report No 18, printed by United States Fish and Wildlife Service, Chicago, 1944
- 2/ At the Fourth International Fishery Congress in 1908, during the discussions on menhaden, Professor Goode was quoted to the effect that he estimated a million, million of millions of menhaden (10^{18}) were killed annually by natural enemies. Goode considered this only an approximate estimate. W. F. Hathaway's paper, read at the same meeting, indicated that both Dr Hugh M. Smith and Professor Baird approved of this general figure and the reasoning by which it was deduced. I have made some calculations using Goode's estimate. At one pound each, 10^{18} menhaden weighing 70 pounds per cubic foot, would require about 1.4×10^{16} cubic feet of space. A section of ocean on the continental shelf, one mile square and averaging 50 fathoms deep, would include about 10^{10} cubic feet. Thus, if the 10^{18} menhaden were packed solid, it would require about $1.4 \times 10^{16} \div 10 = 1,400,000$ square miles of continental shelf with an average depth of 50 fathoms to provide room for them. Since the total area of the continental shelf inside the 100 fathom curve, from the Gulf of Maine to the southern tip of Florida, is much less than 100,000 square miles, it would seem that Professor Goode's "approximate estimate" was a little extravagant.

More recently, the head of a large fishing company told me of a case in which 20 haddock were removed from one monkfish. Making the apparently conservative assumption that there were at least 10 million monkfish on Georges Bank, he calculated that with each eating 20 haddock a day, 365 days a year, they destroyed altogether about 73 billion haddock annually. He maintained that in addition, other enemies destroyed additional billions. Our data indicate that in the peak year the total population of market size haddock on this bank was only 300-400 million. Thus, his estimate of haddock killed each year by monkfish alone was about 200 times as great as the total adult haddock population.

These examples illustrate the general beliefs concerning the limitless numbers of fish in the sea, and how these beliefs have been encouraged by faulty deduction based on insufficient or erroneous observations.

knowledge and technical methods needed to solve the very complex problems involved. Even now we are but beginning to make headway in this field and there is as yet no generally accepted philosophy to guide the practical application of the results of technical research work. Our discussion this evening is an attempt to clarify further, in our own minds as well as in those of others, some of the ideas surrounding this subject.

I believe that most of us will agree that the ultimate aim of all our fishery work is to obtain the maximum continuous yield (optimum yield) from our fishery resources in the way of food, value, recreation or other return, for the benefit of our country, our state, our people, and our fishing industry (Fishermen, dealers, etc). Tonight we are concerned with a single, but vital element of this fishery program: what is the best way to go about the formulation and application of practical and efficient management measures designed to make possible these objectives. By itself, this is a complex economic and social problem. Perhaps our approach to it will be clarified if we can gain the proper perspective, that is, see how this particular problem fits into the complete picture of fishery management. Consequently, as a preliminary to the later discussion, I shall attempt to outline the primary elements or steps in a complete program. As the basis for such a program it must be assumed that it is known or believed that the fishery is not yielding its maximum. Some factor or factors is or are limiting the yield.

APPRAISAL OF THE MANAGEMENT PROBLEM

The first step is to diagnose the situation and determine in quantitative terms what factors are limiting production. Frequently history, properly interpreted, will provide a clue. Take, for instance, the overall problem of improving the fisheries of the Maine coast. What caused the decline in Maine's fisheries from 1888 to 1938? Was it due to biological, economic or technological factors? The answer to these questions will help to provide the basis for a rational approach to the present Maine problem. The United States cod fishery provides another example. What caused the decline in this fishery between 1880 and 1935 and how great was the decline? Answer that and you have your principal overall cod production problem. The United States mackerel catch declined from an annual average of about 100,000,000 pounds from 1860-85 to about 20,000,000 pounds from 1888-1923, and about 40,000,000 since 1925. Was this due to changes in the fleet, in fishing methods, in abundance of fish, or to changes in the fish's habits which made them less available to the fisherman's gear? The answers to these questions by themselves are involved and difficult, and an attempt to prescribe a remedy before the questions are answered, might at best be useless and at worst be dangerous.

Assuming that these questions have been answered to the effect that the limiting factor is the quantity of fish available, rather than economic or technological conditions, our second step is to determine what is controlling this quantity. If the stock of fish is reduced, is it due to unfavorable environmental conditions such as temperatures, feeding conditions, unfavorable ocean currents causing loss of eggs or larvae; or to the acts of man in catching too many fish, too young fish, changing the biological balance, or affecting the environment through use of destructive gear, dams, or pollution? How does so-called "destructive" gear such as the otter trawl affect the fish populations? Does it affect the bottom, spawn and larvae, young fish, or through efficiency of operation does it critically reduce the spawning stock?

When we have discovered what conditions are limiting the stocks of fish, the third step is to determine how these conditions can be altered in order to permit the stocks to recover to the level at which they will provide the optimum yield. What are the conditions necessary to obtain the optimum yield? In general, the most important are an optimum adult stock and a fishery that takes the fish when they have reached the optimum size. (The optimum size involves the balance between growth and natural death.) Other conditions that may be critical in some cases are predators, supplies of food, competition, physical conditions, etc.

In no case will it be found that return to virgin conditions of abundance and age composition is the answer, while in some instances the reduced yield may be the best that can be expected.

Once some of the above questions can be answered, it is possible to consider intelligently the application of management measures. Much of the failure of management measures during past years is due to the lack of this basic information. Their failure does not mean, necessarily, that the measures themselves were unsound basically, it means that without the essential knowledge of the ills to be corrected, the correct measures could not be prescribed. In the same way a surgeon might perform a highly proficient tonsilectomy which was prescribed to cure your rheumatism, but if the rheumatism were caused by infected teeth, the net result on your ailment would be nil. This does not prove that tonsilectomies are valueless; it simply proves the prescription was wrong.

It is possible to point out many examples in fishery administration, of prescriptions based on insufficient, erroneous, or completely lacking diagnosis. For instance, following the mackerel decline in 1885 and later, Congress passed an act prohibiting the landing of all mackerel caught between March 1 and June 1, except that caught by hook and line, traps, and weirs. This was in effect from 1888-92. It was a move in the dark and had no measurable effect in increasing the mackerel population. Failure simply meant that it was not the cure for that particular ailment, although it might be for another. The history of the lobster

fishery records a long series of protective regulations, despite which the population of lobsters continued to decline. Most of these regulations were based on limited scientific facts or on personal opinion and, as the catch declined, pressure was increased to relax regulations. Personal opinion and limited facts were not sufficient bulwarks to prevent such action and regulations were relaxed progressively. So again, the methods were not necessarily wrong but lacking a fixed background of fact, it was not possible to devise adequate measures and defend them with sufficient determination and effectiveness. This might compare with the case of an individual who is dying from diabetes. The doctor believes that insulin will help, but lacking knowledge of how much is needed, prescribes an amount which slows down the approach of death but does not prevent it.

These examples might be continued at length and in most cases where protective measures failed, the failure was the effect of erroneous diagnosis or inadequate prescription. If we had adequate factual information from scientific research, showing quantitatively the conditions needed in the way of fish sizes, spawning stock magnitudes, or other conditions required for the optimum catch, it would be possible to make the diagnosis more accurate and the writing of an adequate prescription would be simplified. To attempt to prescribe before accurate diagnosis is to revert to the level of medical practice in the Dark Ages. An exception to this should be made to cover cases in which fishery restrictions are used to alter conditions for experimental purposes, but this is not a prescription if used in this way and the purpose of such restrictions should be understood clearly.

This brings us to the fourth step in developing a management program, the formulation of effective, practical and adequate measures which will produce the conditions found to be necessary to permit the optimum yield. First of all, what are the technically ideal methods; that is, what methods theoretically are most effective and efficient? Second, what modifications, if any, are necessary to make the ideal methods economically and socially practical, and can these modifications be made without depriving the methods of their effectiveness? For instance, it might be proved that the optimum size for taking lobsters was $3\frac{3}{4}$ inches. However, if there were a very limited market for lobsters above $3\frac{1}{2}$ inches, the practical economic level to be considered as a minimum would be $3\frac{1}{2}$ inches instead of $3\frac{3}{4}$ inches. This economic limit of $3\frac{1}{2}$ inches could be applied in a single increase from $3\frac{1}{8}$ inches to $3\frac{1}{2}$ inches, but that would not be socially practical since it would reduce the catch so seriously during the first one or two years that large numbers of fishermen and dealers would not be able to survive. Consequently, a reconciliation of biological, economic,

3/ Carapace measure

and social requirements might result in a program involving a series of one-sixteenth inch or one-eighth inch increases at one- or two-year intervals until the 3 1/2-inch size was reached. This would provide the best practical conditions in respect to size. Other measures might be necessary if further protection were needed to maintain the most productive spawning stock.

FORMULATION OF MANAGEMENT MEASURES

To simplify and limit the discussion, it will be assumed that the primary purpose of the desired measures is to establish or permit a fishery which will produce the optimum yield from a given stock of fish, for our primary object is conservation. Improved economic and social conditions would be very important, but secondary, objectives. If you wish to reverse this order of importance, then the problem is primarily for the economist or sociologist instead of the aquatic biologist or conservationist.

In order to take up the next step in this program it will be assumed that the data required for steps 1-3 have been obtained and they show that: 1. The limited production from a given stock of fish is due to reduced catches. 2. The reduced catches are due to the decreased production of young resulting from an overfished spawning stock and from catching most of the fish while they are much below their optimum size (size at which natural death balances growth). 3. That the conditions necessary to provide the optimum yield require an adult stock double the present level of abundance and an average fish size of three pounds compared to the present average of one to two pounds. Our problem is to formulate measures which will change the fishery in such a way as to obtain these conditions. This is a relatively ideal situation in which all of the needed biological answers are available before it is necessary to take regulatory action.

To Obtain the Optimum Size

In situations where unnecessarily small fish are being taken, the use of minimum size limits perhaps offers greater possibilities than any other measure. Protection in this way results in the small fish reaching a more productive size, thus increasing the yield in pounds from the same numbers of young fish. The protection of young also permits the survival to spawning size of increased numbers of fish, and this will help to correct any overfished condition of the spawning stock. This latter effect may be much more important than the first. Even when no overfishing is taking place, protection of the young may be worth while in situations where undersized fish (those below the optimum size) are taken, since it will result in a greater abundance (in pounds) and therefore in a higher yield per unit of effort. However, if the fishing intensity is low there may be exceptions to this generalization, particularly in cases where an overabundance of adults inhibits the production or survival of young (Figures 1 and 2).

EFFECT OF SIZE LIMITS

If 50% is Caught Annually By Fishery

And 15% Dies From Natural Causes

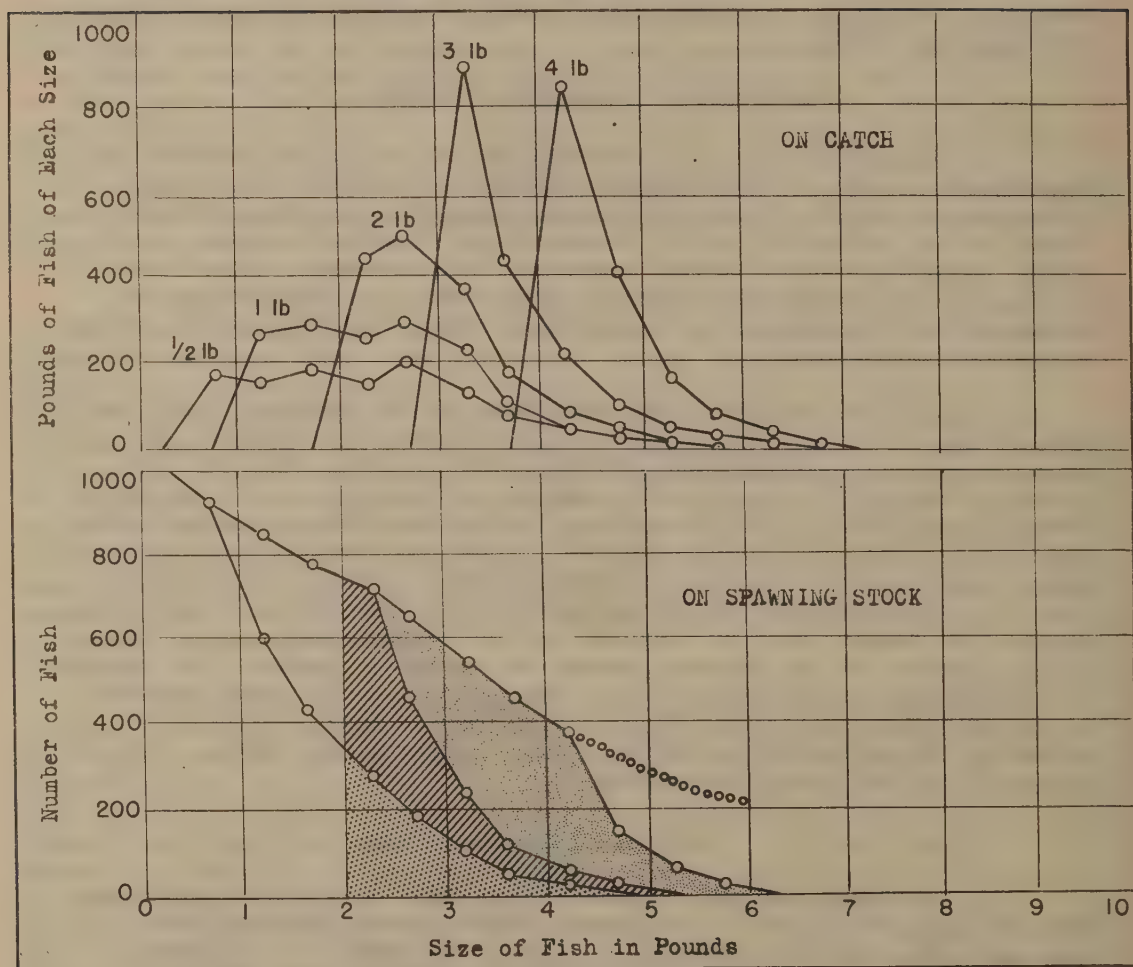


Figure 1. - The effect of size limits on the catch and spawning stock, using data on growth rate, natural mortality, and size at maturity, from the haddock fishery, and assuming an addition to the stock each year of 1,000 quarter-pound fish. The upper figure shows the pounds of fish of each size that would be taken with the various size limits in force.

In the lower figure, the area below the curves represents the number of fish of each size left on the banks under various size limits. The dotted curve represents the stock when there is no fishery. The total shaded area represents the number of mature fish left with a four-pound size limit in effect; the total of medium shaded and black area represents the mature stock left with a two-pound size limit in effect; and the black area represents the mature stock left with a one-half-pound size limit.

EFFECT OF SIZE LIMITS ON CATCH AND SPAWNING STOCK

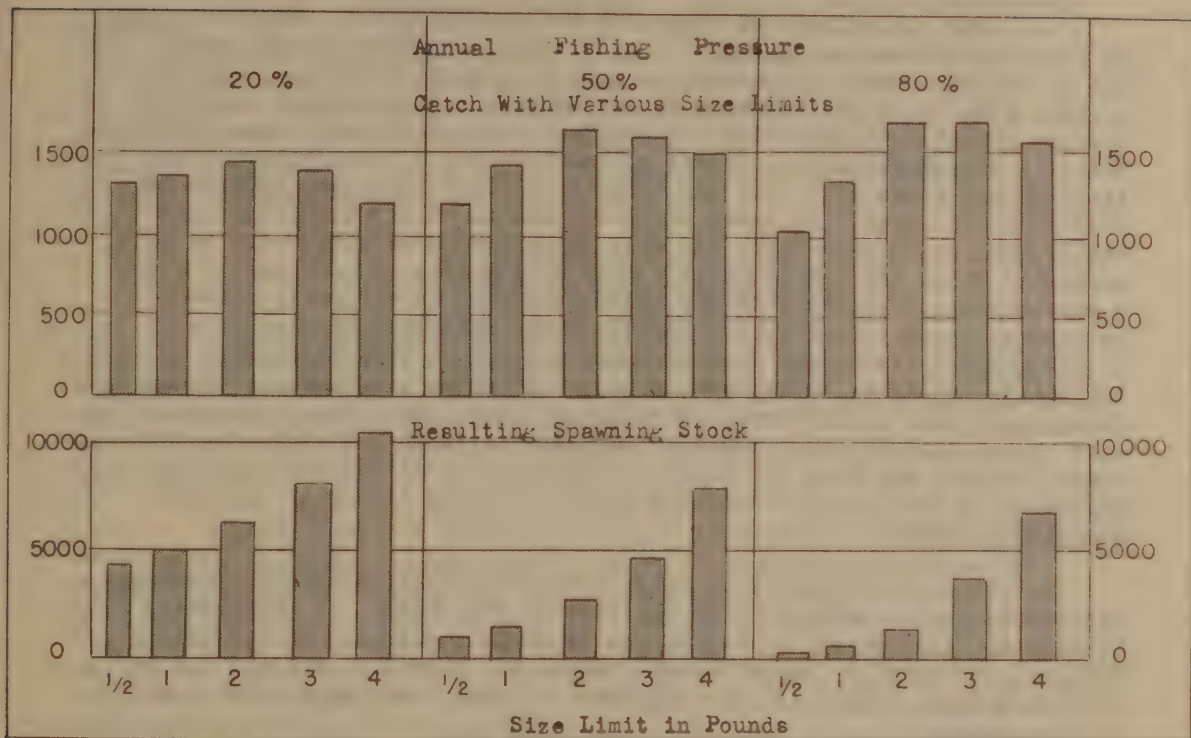


Figure 2. - The effect of size limits on the catch and spawning stock.

The data shown under 50 percent fishing pressure, are summaries of the weights shown in Figure 1 for each size limit. Data for 20 percent and 80 percent fishing pressures were calculated in a like manner. Note the considerable effect of size limits on the catch when the fishing pressure is high and the tremendous effect on the spawning stock.

This is a simplified picture based on the assumption that the annual production of young fish is constant (1,000 quarter-pound fish). Thus, as shown in this figure, the increased catch with intermediate size limits results entirely from concentrating the fishery on fish near the optimum size. In the case of the haddock fishery at least, we know that the production of young is closely related to the size of the adult stock. Consequently, the increase in the spawning stock resulting from size limits would have a much greater effect on the catch than that represented in Figure 2, which is the result solely of concentrating the fishery on the best sizes. At the lower levels of spawning stock magnitudes, the increased stock resulting from higher size limits would result in a greatly increased production of young; while at the higher levels, any increase in spawning stock would be harmful since it would decrease the survival of young. Thus in fisheries of medium and high intensity, the actual increases in catch derived from intermediate size limits are much greater than are indicated in this example.

For the purpose of obtaining the optimum yield, the ideal size at which to harvest any group of fish is when the annual growth rate has slowed down until it equals the rate of natural mortality (optimum size). However, since normally it is impossible to determine this size exactly for all the individuals of a given population, and furthermore, since it is impossible to capture all of the desired proportion of the stock at any given size, the practical size limit must deviate considerably from the ideal. In cases where the fishing intensity is low and the natural death rate high, the most productive size limit will be considerably below the optimum size. This will enable the fishery to catch a considerable proportion of the stock before it is seriously reduced by natural death. On the other hand, if the fishing intensity is high or the natural death rate low, the most productive size limit will be but little less than the optimum size. Conditions intermediate between those cited will require some intermediate size limit. Thus, the position of the theoretically most productive size limit will vary for different species and even for different populations of the same species, depending on the interrelationship between fishing intensity, growth, and natural death.

The effective use of size limits depends on a number of characteristics of the species and of the fishing gear used. If the species is sufficiently rugged so that it can be caught, sorted, and released without considerable losses through mortality, then a size limit can be readily applied. Most of the flounders and many fresh-water fish are in this category.

For a species which cannot survive handling in this way, some form of savings gear may be effective. This gear must allow the release of the fish at such a time and in such a condition that most will survive. Satisfactory forms of savings gear have been developed for haddock, cod, flatfish, possibly lobsters, and many other species. This method is desirable even for species that can stand catching and sorting, since it reduces the hand labor and removes the temptation to keep the small fish. The chief disadvantage of such gear is that it is not precise in its cull; that is, a gear which retains all fish above a specified size, also will capture considerable numbers of fish just below this size. Consequently, allowance must be made for this characteristic, both in the savings gear specifications and in enforcing the minimum size limit.

Some species fall into a third category which includes those which neither can survive catching and sorting, nor can they be culled effectively by types of savings gear now available. This group may include the rosefish Sebastes marinus, the mackerels, herrings, and others. To use size limits successfully for these species it will be necessary to develop other types of savings gear, or to protect the small fish through closed seasons, closed fishing grounds, or by the use of other measures.

For most fisheries there appears to be no sound argument, biological, economic or social, against size limitation, except possibly that referring to the hypothetical genetic effect of size selection on the size of fish in future generations. There also may be exceptions for economic reasons, such as those involved in the case of sardine herding. If practical and effective methods of size limitation can be devised, this should be one of the first tools to be considered by those planning management measures.

To Obtain the Optimum Adult Stock

For the present, let us assume that before considering this question the administrator has been supplied with information showing that the current spawning stock is considerably below the ideal size, and that the reduction was due principally to overfishing. What is the best method for obtaining the conditions needed to build up and maintain the ideal stock?

The size of the spawning stock is affected by numerous environmental factors including the fishery, fish food, natural enemies, and others, but in a marine fishery the first-named usually is the only one that can be altered appreciably by man. Assuming that the best practical size limit is in use and has not provided sufficient protection to enable the spawning stock to reach the optimum level, the next thing to consider is the fishing intensity. The spawning stock is too small because too many fish are being destroyed by catching or other operations conducted by man. Assuming the destruction is due to fishing operations, how shall this be remedied?

A considerable variety of restrictive methods for reducing fishing intensity are available to the administrator. The ultimate purpose of all is to limit the catch to the amount which will permit the maintenance of the optimum spawning stock. Probably the most important of these methods are the following:

Direct Catch Limitations

Direct catch limitations might involve the establishment of annual or seasonal quotas for given areas. When the quotas were filled, fishing would be halted. The most drastic application of this method would require the complete stoppage of fishing (zero quota) until the stock had been restored to the desired level. Since the most rapid recovery of the spawning stock usually can be obtained by using zero quotas, this method is used in many cases to restore wild populations depleted by sportsmen or by natural catastrophes. In the case of commercial species, however, there are numerous economic and social reasons for avoiding such drastic action. These include the effect on the livelihood of

the fishermen and the danger of causing manpower and equipment to change over to other fisheries or occupations. In the latter event, inadequate fishing capacity would be available to make use of the increased supply of fish when fishing was resumed. Sportsmen can give up duck shooting for several years when such hunting is closed, then return to it in equal or greater numbers than ever when open seasons are resumed; but a commercial fisherman must starve or turn to some other occupation if fishing is stopped. There also are certain biological reasons which indicate that complete cessation of fishing is not the most efficient method to build up the adult population.

Because of the undesirable effects of zero quotas, which have been referred to above, in the commercial fisheries, it is better to use reduced, rather than zero, quotas when such limitations are necessary. The extent to which they should be reduced will depend on the situation; in general, the smaller the reduction the longer it will take to build up the stock to the desired level. Usually it will be possible to increase the quotas somewhat after a rather short period, since with an increased spawning stock, the recuperative powers of the population are increased. Consequently, it may not be necessary to reduce the catch below the prerestricted level for more than a brief period (Figure 3).

The advantages from using the method of direct catch limits are numerous. It is the most direct, precise, flexible, and effective method available. When the catch is too great by any given amount, it can be reduced by that amount. Changes can be made from year to year if they are found to be necessary. The experience of the International Fisheries Commission demonstrates that enforcement is practicable.

The chief disadvantages is that if the permissible quota is filled before the normal fishing season is over, fishing for this species nevertheless must cease. Men and gear then must shift to some other fishery or occupation for the balance of the year or remain idle. If the gear remains idle, it creates technological inefficiency which is undesirable. If men remain idle, it creates a more extended vacation, which is good or bad depending on your point of view concerning the value of time for recreation and mind improvement. If the combined effect is such as to hold the returns on time and investment to levels unattractive in relation to other occupations in that region, it will result in a gradual transfer of money and manpower to other occupations, until the balance is reestablished.

Other undesirable effects of the stoppage of fishing when quotas are filled, are the loss of supplies of fresh fish to the public and a protracted period of unemployment for the shore workers. Effects of the former are reduced by the increased use of frozen fish and cold storage, while effects of the latter might be reduced by staggered opening dates for different areas, or by other arrangements.

EFFECT OF MANAGEMENT ON YIELD

Assuming Annual Earnings are 50% of Capital

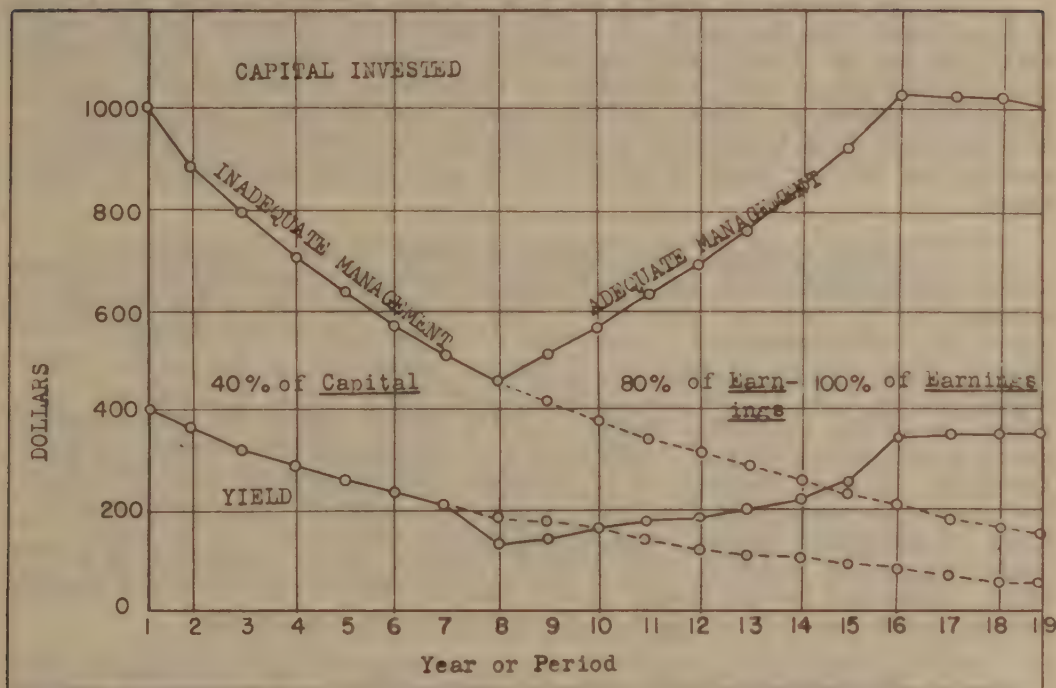


Figure 3. - The effect of management measures on yield as illustrated by investment and earnings. This example assumes a private business with an original capital of \$1,000 and annual earnings of 50 percent on the investment, with the withdrawals (yield) taken out the first of each year. Under inadequate management, when 40 percent of the capital was withdrawn annually (years 1-7), there was a continued decline in capital and yield. Under adequate management, which restricted yield at first to 80 percent and later to 100 percent of earnings (years 8-19), capital was rebuilt and the increasing yield in three years (years 8-10) was equal to what the decreasing yield would have been under inadequate management; thereafter it was increasingly greater.

This example represents essentially what occurs in an overfished fishery when the catch, which at first is greater than the annual increase in the stock, is brought into balance by properly planned management measures. However, the fishery problem is considerably more complex than this, due to natural mortality (death from natural causes), migrations, variations in production of young, and other factors.

Indirect Catch Restrictions

The purpose of nearly all other types of restrictions on fishing, if considered from the point of view of conservation, reduces to the same basic purpose as direct catch limitations. Closed seasons, closed areas, and restrictions on gear and number of fishermen, all are methods for reducing the number of pounds of fish taken. Even minimum size limits can be considered from this point of view, since the first effect from protecting the smaller sizes is to reduce to some extent the number of fish taken.

Closed seasons. This method has most of the disadvantages of direct catch limitations and few of the advantages. Probably the only argument in its favor is that it is easy to enforce. It is not precise, since the effectiveness of a reduction of 20 percent in the season's length, in an effort to obtain a 20 percent reduction in the catch, would depend on the time of the year included and might easily be rendered ineffective if the fishermen worked a little harder during the open season. Results also would vary if conditions were particularly favorable or unfavorable for good fishing, or if improved fishing methods were devised. The method is reasonably flexible, since the length of the closed period might be increased or decreased to any extent necessary. If it were varied according to total catch landed, then it becomes essentially a catch limitation rather than a closed season. The effect on shore workers and consumers would be similar to that from catch limitations.

The chief virtue of this method is that it can be enforced with a minimum of data. When the season ends, fishing stops regardless of the quantity of fish caught. Thus, it would not be necessary to obtain current records of landings. However, since reasonably current data on landings would be needed for any adequate management program, this saving would be largely fictitious.

Closed seasons frequently are used to protect the fish during the spawning season. Closure during this period is somewhat more beneficial than closure during equivalent portions of other seasons, but the benefits are not nearly as great as generally is believed. Capture of 1,000,000 pounds of butterfish six months before the spawning season kills nearly as many eggs as does the capture of the same number of fish just before they spawn. However, there are some advantages to protection during spawning. First of all, 1,000,000 spawning fish represent a little higher egg potential than do 1,000,000 fish six months earlier, for the latter group will lose some of its number through mortality. The second and probably most important argument for protection during and just following spawning is that during this period the fish are in poorest condition. Thus, if the effect of spawning reduced the average weight of the fish by 25 percent, a population of adult fish weighing 100,000,000 pounds before spawning would be reduced to 75,000,000 pounds during and

just following the spawning season. The weight of the population would then recover toward 100,000,000 pounds again during the following months. Consequently, the potential yield from this population will be greater if no fishing is carried on during this season of poor condition, for a given number of fish will yield one-third more pounds of fish after they have recovered their weight than they will during this season. The amount to be gained in this way will vary for different species. In the case of haddock it would be small, since the gain in average weight between the spawning season and the summer is only 10 to 15 percent. In the case of mussels it would be large, for the average weight of the meats will more than double between the summer and winter seasons.

When used for the purpose last discussed, the closed spawning season is somewhat similar in its effect to the minimum size limit; fish of low individual weight are protected until they gain in weight and thus permit a greater yield.

It appears from these data that if a closed season is to be used to limit the catch, the best time to apply it is during and following the spawning season. However, this measure by itself usually is not effective in limiting the catch to any desired level, since there is a strong tendency to compensate for the reduced fishing time by increasing the fishing intensity during the open season. Consequently, the closed season usually should be considered a secondary management measure to be used only in special circumstances or in conjunction with other measures.

Closed areas. Closed areas usually are used either to protect fish during some specific stage in their biological development or to provide a sanctuary for the species. In the first case, the area might include the nursery grounds where the young are concentrated, or it might cover spawning areas. Thus, in the first example, the closed area is used as a substitute for size limits to protect the young, and in the second, as a substitute for a closed spawning season to protect the spawning adults. In neither case is it as precise a measure as the one for which it substitutes, for with marine species it usually will not be found that segregation by size or maturity will be sufficiently clear cut to permit selection of an area that will include only those fish which it is desired to protect. Most anadromous fish are exceptions to this generalization, since they leave the river before reaching their full size.

Use of closed areas as sanctuaries is based on the argument that by providing grounds where the fish will be able to reproduce and grow without molestation from man, they will multiply and spread out to restock the heavily fished areas. This method usually is inefficient, since it generally results in the overstocking of the sanctuary areas and the understocking of the unprotected areas. In neither case does this provide for the most effective use of the natural food supply.

Closed areas used to protect small fish, spawning fish, or as sanctuaries usually will not provide a precise instrument for maintaining the spawning stock at any desired level or for providing protection for fish below a given size. From the point of view of precision, it is one of the poorest methods available.

Closed areas may be flexible in their dimensions, but the dimensions probably would have no simple relationship to the effect on the fish population. Consequently, the flexibility could not be used effectively in a management program.

Facility with which closed areas can be enforced will depend to a large extent upon their location. In inshore areas they can be defined and observed with some facility and enforcement would not be difficult provided sufficient inspectors and patrol boats were available. On the offshore banks the areas might be defined precisely in latitude and longitude, but their boundaries would be difficult to observe; particularly in overcast and foggy weather. If such areas were large or numerous, enforcement would require a considerable patrol fleet.

In view of the limited advantages and numerous disadvantages of closed areas as a method for management, it is obvious that they should be resorted to only when more effective measures will not function or for special cases in which some peculiarity of the fish or fishery makes them suitable.

Restrictions on gear. This type of restriction may take the form of a limitation on the amount of gear that can be used by a single fisherman or on the type of gear that can be used. Restriction of the total amount of gear that can be used in a fishery would amount to restrictions on the number of fishermen if there were a limit on the proportion of the total which could be fished by one man.

Restrictions on the amount of gear that can be used might consist of limits on the number of lobster pots, length of seine, or size of otter trawl. In general, this amounts to telling a man how hard he can work (number of lobster pots) or how efficient equipment he can use (number of plows a farmer can use in a gang plow, width of his hay rake, etc). To the extent that we believe that it is advantageous to the state and nation to have industrious citizens and to make use of efficient machinery for production, we must agree that in general such restrictions on gear are undesirable.

Restrictions on the type of gear that can be used might consist of prohibiting the use of otter trawls or certain types of otter trawls, or barring the use of explosives, line trawls, etc.

Considered from the point of view of limiting the catch, restrictions on gear usually are neither efficient, precise, nor flexible, and their occasional ease of enforcement does not compensate for their numerous weaknesses. However, they may be very desirable for special purposes; for instance, gear that is unduly destructive to the fish, to fish food, or to the fish's environment, is undesirable even though it may be very efficient technically. On the other hand, it appears to be highly fallacious to bar a type of gear because it is too efficient. An example of the first type might be dynamite, one of the last type would be the barring of line trawling in favor of hand-lining. Otter trawls provide an intermediate example. As usually used, they are destructive of small fish, but if this effect is corrected, the chief basic charge that can be proved against them is that they are efficient. If the destructive characteristics cannot be remedied, then there is a valid charge against this gear on the grounds of conservation, but any charge based on the grounds of efficiency must look to debatable social arguments rather than to biological. In some cases, even though a gear is incurably destructive, its use may be justified if no other practical gear is available, for if its use were barred, the fishery would disappear.

Regulation requiring the use of savings gear is a form of restriction when it requires some change from the gear normally used. Since it is used to convert a destructive type of gear into a non-destructive type, it is a desirable conservation measure. Used for protecting certain sizes of fish, it may be a reasonably efficient, precise, and flexible measure (mesh sizes, slat spacing in lobster pots), but if used for limiting the quantity of fish taken, it possesses these characteristics to a much lower degree. Usually it can be enforced with reasonable facility. In those cases where the best savings gear available is inefficient, unprecise, and difficult or expensive to apply, its use may be impractical and therefore undesirable, even though it might to some extent reduce the destructive effect of the gear to which it was applied.

Restriction on the number of fishermen. As generally applied, this method requires that all fishermen be licensed and that the number of licenses issued be limited to some predetermined number. For conservation purposes the number issued would be based on the results of studies showing how large a catch should be taken from a given population of fish and the average catch per fisherman. If the fishermen should increase their efficiency or improve fishing methods by developing better gear or boats, then the number of licenses would be decreased until the total catch again was reduced to the desired level.

In general fishermen can vary their catch over a rather wide range. For instance, the lobster fisherman may fish any number of pots from a few up to several hundred, and he may fish one month or 12. Furthermore, the number of pots that can be handled by one man will vary

from place to place, for the maximum number of pots that can be taken care of under certain conditions will be only a fraction of what is possible under others. The catch taken by a salmon trap will depend on the length of the leader as well as the location of the trap. The catch of a purse seine will depend on its size; that of an otter trawl upon the towing speed of the boat as well as the size of the net. Consequently, to have any degree of precision in limiting the catch, restrictions on the number of fishermen must be accompanied by restrictions on gear. Thus, the number of lobster fishermen would be fixed as well as the number of pots per fisherman. In the haddock fishery, it would be necessary to specify the number of fishermen and boats, the size, power and equipment of the boats, and the kind and size of net.

If this method were used as described, it would provide a reasonably effective, precise, and flexible instrument for controlling the catch and it would be relatively easy to enforce. The chief lack of efficiency would occur in fisheries where the fishermen could vary their individual effort over a considerable range. For instance, in the lobster fishery a limit of 100 traps per man might be allowed. Under some conditions a man normally might be able to handle 200 traps, so under this restriction he would be forced to work at 50 percent capacity. Furthermore, in years when lobster prices were very low or the attractions of other work high, the average fisherman might reduce the number of traps he fished, or months he operated, sufficiently to lower the catch 25 percent or more below the desired level and no one else would be able to make up the difference. In fact, it is not unheard of to have certain combines reduce production in order to increase prices. In this event, the public would be deprived of quantities of foodstuffs; possibly needy fishermen would be deprived of the opportunity to capture a permissible quantity of fish; and the surplus left on the fishing grounds might inhibit survival of young so as to reduce the production of fish for several years thereafter. If adjustment were made for the reduced catch during one year by issuing additional licenses the next, and at the same time, part-time fishermen returned to full-time fishing, then the catch would jump far beyond the desired level. These variations would take place even though both men and gear were restricted.

Discussion of Relative Merits of Various Methods

From the point of view of conservation, the best methods of management are those which are most effective, precise, flexible, and enforceable. On this basis, the methods which have been discussed rate somewhat as follows:

Minimum size limits, where they can be applied, have many advantages and few disadvantages. Consequently, this method rates as one

of the best at the disposal of the conservationist. This seems to be so obvious that no further discussion is needed.

For the purpose of holding the catch at the level which will provide for the optimum adult stock (this catch may vary somewhat from year to year), a number of methods are available. Judged by the standard previously stated, the most satisfactory method in most cases is the actual limit on the catch. All other methods are indirect attempts at the same objective. Closed areas and closed seasons are useful for certain special situations but provide no overall substitute for actual limitation on the catch. Restrictions on men and gear provide a general substitute for catch limits, but involve complications and inefficiencies which make them technically less satisfactory for general use. However, they may provide the best solution for special cases such as fixed trap and net fisheries, where fixed locations can be occupied and one net can blanket another.

APPENDIX E

ENFORCEMENT OF REGULATIONS

by
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Visiting Expert Consultant

January 1951

1. General

The Japanese coastal fisheries are in a chaotic condition featured by too many fishermen, overfishing, contradictory and ambiguous laws and regulations, widespread law evasion, and inadequate law enforcement, accompanied by a general lack of appreciation of the serious nature of the situation.

If the Japanese really wish to bring order out of chaos and insure the continued productivity of their fishery resources they can do so. Redefinition of lines of authority, slight changes in the structure of national and prefectural fisheries departments, and clarification and simplification of the laws and regulations will go a long way toward improving the situation. But what is needed most of all is an awakening to the challenge of the crisis, and a determination to make the necessary changes and follow through with strict enforcement of the measures that are adopted.

2. Recommendations

The following recommendations are made in the hope that they will help to improve the situation:

a. Designation of Responsibility

(1) Lines of authority and responsibility should be clarified. The Minister of Agriculture and Forestry should be given the responsibility for maintenance of Japanese fisheries.

(2) Authority over designated local fisheries should be delegated by the Minister of Agriculture and Forestry to the prefectural governors. All delegation should be specific rather than general.

(3) The establishment of united and interprefectural Sea-Area Fisheries Adjustment commissions should be encouraged. Regulations and ordinances should be based upon the recommendations of the various Sea-Area and Inland Fisheries Adjustment commissions.

1/ Extracts from Natural Resources Section Preliminary Study No 46, Japanese Fisheries Administration, Tokyo, Mar 1951.

b. Administrative Changes

(1) Consideration should be given to granting the fisheries more recognition in the national government, either by elevation of the Fisheries Agency to the status of a cabinet ministry, by appointment of a special adviser to the Prime Minister, or by some other method.

(2) A patrol and enforcement department should be established in the Fisheries Agency; this measure is the key to the solution of the problem facing the Japanese Fisheries.

(3) Many of the prefectural fisheries departments should be reorganized. The Fisheries Agency should furnish effective guidance to the prefectures so that a uniform structure can be developed, based on the organizational plan of the better prefectural departments. Each prefectural fisheries unit should have its own patrol section to supplement the national fisheries patrol.

(4) Fisheries ordinances and regulations should be simplified and modernized.

3. Establishment of Patrol Department in Fisheries Agency

If the fisheries laws and regulations are to be of any value whatsoever, means must be provided for enforcing fisheries regulations. At present no governmental organization is capable of performing adequate patrol work.

The statement can be made without qualifications that the most essential change in the entire fisheries administrative structure is the establishment of a fisheries patrol force. No changes in the regulations, no improvements in the licensing system, no theoretical solution of any fisheries problem will be of the slightest value without an adequate means of enforcement. Violations are universal, and only a vigorous patrol will curb them. The Fisheries Agency as it is now constituted cannot meet the threat to Japanese fisheries presented by widespread flaunting of the law. With some changes in structure, however, and with a new viewpoint on the part of some of its leaders it could bring the situation under control. The establishment of a fisheries patrol unit in the Fisheries Agency is an essential step that should be taken immediately.

Under the law, the Minister of Transportation shares responsibility with the Minister of Agriculture and Forestry for the enforcement of fisheries regulations. The Transportation Ministry's participation in this divided assignment is through the Maritime Safety Agency, which has part of its budget earmarked for fisheries patrol. The Coast Guard Division of the agency, with all its other duties, is in no position to give proper attention to the enforcement of fisheries regulations. Certainly past performance has been disappointing. In the United States the Coast Guard has a similar function. It maintains only general surveillance of

the fisheries, mostly from the standpoint of vessel safety. The United States Coast Guard's enforcement function in the fisheries is primarily in the matter of regulations imposed under the terms of international treaties, and even in that respect it is but one of several enforcing agencies. The writer recommends that the authority of the Japanese Maritime Safety Agency to enforce fisheries regulations be maintained as a secondary function, and that it act as a supplement to the Fisheries Agency patrol, thus providing additional coverage.

The prefectural fisheries departments by themselves have proved unable to control the situation. Their funds and facilities are inadequate, and their authority is limited mainly to the small areas of water lying directly off their own coasts. Obviously they cannot even begin to control interprefectural fisheries. Patrol of local fisheries by the prefectures has its place, however, as will be pointed out in the section on prefectural administration.

At present the patrol, inspection, and surveillance functions of the Fisheries Agency are scattered among several departments and sections. In the Administration Department, the First Fisheries Adjustment Section has charge of coastal patrol and the Second Fisheries Adjustment Section handles fresh-water patrol. Most of the patrol effort of these two sections consists of guidance for the prefectural inspection officers. The Ocean Section of the Production Department handles the bulk of the enforcement work and operates the patrol boats.

Concentration of all patrol and enforcement work in one department is recommended. This patrol unit should be designated as a full department on a level with the departments of Administration, Production, and Research. The chief of the Patrol Department must be the best man obtainable, experienced in the fisheries, and possessed of strong determination. He would be responsible directly to the Director of the Fisheries Agency. This change in organization will require amendment of the Fisheries Agency Establishment Law.

The term "fisheries patrol" is not used in the prevailing concept which is to cruise around, watch the fishermen, and help them catch more fish. Nor is it used in reference to patrolling the "MacArthur Line" (SCAP authorized fishing area) to keep fishing boats inside, which is a separate problem. This discussion is concerned particularly with coastal waters, and the term "fisheries patrol" is used to mean the detection and prevention of all forms of violations and evasions of ordinances, regulations, and license requirements.

The Patrol Department would be responsible for insuring compliance with all types of fisheries ordinances, regulations, and requirements. Its functions would be: (1) detection of violations, (2) apprehension of violators, (3) preparation of supporting evidence, and (4) delivery of violators and evidence to procurators.

All personnel of the department would devote their full time to duties connected with patrol; they should not be required to perform any other duties. This provision is particularly essential for the patrol boats, which must not be diverted to perform research or experimental fishing.

The Patrol Department would not initiate recommendations for the development of regulations; that is a function of the other departments. The Patrol Department, however, should be consulted on all ordinances and regulations under consideration by the Minister of Agriculture and Forestry so that it can advise on practicability, enforceability, and possible loopholes. The Patrol Department would confine its recommendations to the improvement of existing and proposed ordinances and regulations from the standpoint of making compliance and enforcement easier.

The statement already has been made that no regulations are of any value unless enforced by a patrol unit. In its turn the patrol force is valueless unless its leader and its members are willing to work and to make arrests when necessary. The entire personnel must understand the background of the fisheries, the reasons for enactment of regulations, and the over-all dangers to the fisheries that follow noncompliance. They must want to take an active hand in helping the fisheries. This sincere desire to further the best interests of the fisheries, this determination to uphold law and order, must permeate the entire staff from the Director of the Fisheries Agency and the chief of the Patrol Department on down to the newest recruit. Without the will to enforce the requirements there can be no enforcement. A patrol force that is unwilling to perform its duty is useless. The Japanese fisheries need a real patrol unit, not just a group of men in uniform.

The Patrol Department should contain specialists in such fields as the designated high-sea fisheries, vessel licensing, fishery rights, trawl fisheries, and purse seine fisheries. However, its field enforcement officers must be trained to enforce all types of ordinances, regulations, and license requirements. Many of its personnel could be drawn from existing sections and given specialized training in patrol work. The training is extremely important; giving inexperienced men a great deal of authority would be a mistake, for decisions based on unseasoned judgment might lead to injustices which would cast discredit on the entire organization.

Contrary to prevalent belief, the greater part of patrol work could be conducted by enforcement officers on the shore. Patrol boats are necessary, but officers working at the fishing ports can accomplish a great deal, particularly in the matter of checking vessel licenses. A well-trained group of alert, intelligent, and enthusiastic fisheries officers can not only enforce the regulations and requirements but also maintain the respect of the fishermen.

While the importance of shore patrol is emphasized, the necessity for a fleet of fishery patrol boats also must be recognized. They are required for patrolling coastal waters and the nearby offshore banks, a function not to be confused with the patrol of the MacArthur Line. The best type of patrol craft is a small, fast launch; they should not be the large, palatial yachts now the vogue. In most Japanese waters, speedy cruisers something like air-sea rescue boats, about 20 meters 2/ in length, would be of the greatest value. Such boats require small crews, are relatively inexpensive to operate, and are seaworthy in any weather that will permit fishing boats to operate. In the Inland Sea and the sheltered bays, smaller launches about eight meters in length would be most suitable. One essential requirement is that the boats be owned and operated by the Fisheries Agency. Chartered boats are of doubtful value in any enforcement work, particularly in coastal waters.

The patrol boats must be fast enough to catch the fastest fishing craft, because the chronic violators always have the speediest boats in the fleet. Fitting the boats with radar as soon as the equipment is made available would be desirable; the use of radar increases a patrol boat's efficiency tenfold. They must be equipped with two-way radio so that they can work together as a unit. Inasmuch as the shore and vessel patrol must be integrated closely for best results, ship-to-shore radio facilities should be provided. In view of the actual armed defiance of some violators, as reported officially, the patrol boats should be armed. Rifles and shotguns would be an adequate deterrent.

Without question, an efficient patrol force will cost a substantial sum. When strenuous efforts are being made to economize in governmental expenditures, a recommendation for establishment of a new department may seem out of place. However, not all of the costs of the new department would be additional expenditures, as most of the personnel and some of the equipment would be drawn from existing departments. Operation of the new department in the most economical manner is urged strongly.

If the project is to succeed, the fishery enforcement agents must be of sufficiently high rank to command respect from the fishing industry and their salaries must be sufficient to discourage temptation. Furthermore, the acquisition and operation of suitable patrol boats will require considerable expenditures. Therefore, to assure the best possible results with the funds likely to be available, the writer recommends that the Patrol Department be established on a small scale initially, perhaps with not more than 50 shoreside officers, five 20-meter patrol boats, and five smaller speedboats. A small department will be both efficient and relatively inexpensive. A small but coordinated force of well-trained enforcement agents can accomplish more than a loose group of thousands of inefficient, underpaid job holders. A small fleet of fast patrol boats which are kept in constant operation is of much more value than 50 vessels tied to the

2/ One meter equals 3.281 feet.

dock for lack of operating funds or qualified commanders and crews. If the emphasis is on quality, an elite force will be developed. As this fact becomes known, it will attract good men who will want to be part of such an organization. Then when expansion is possible, recruiting will be easy.

To supplement the work of the Patrol Department, the Fisheries Agency should conduct additional conservation education work among the fishermen. Information on the reasons that lie behind the ordinances and regulations should be disseminated widely by means of the press, radio, leaflets, and posters. All inspection officers should be required to become familiar with this educational material so that they will understand the need for the regulations and other restrictions that they are enforcing in order to maintain fisheries production.

APPENDIX F

TECHNOLOGICAL DEVELOPMENTS WHICH WILL INCREASE FISHERMENS' PROFITS

by
Claude M. Adams

February 1951

1. Increasing the Profits of the Individual Fisherman

a. Improving the Quality and Therefore the Value of the Catch

Fish is a highly perishable article, and if the quality is lowered the value drops. The logical place to begin to take proper care of this perishable item is when it is caught. Bacteria increase on the surface and in the flesh and intestines of a fish from the moment it is killed. The sooner this action can be retarded the longer the fish can be kept in good condition. Too often fishermen are inclined to leave fish lying about on decks exposed to the sun and wind while the fishing operation continues, and in many instances insufficient ice is used. Also, little thought has been given to improving facilities aboard fishing vessels.

During the time when a serious food shortage existed in Japan and controls on both distribution and price of fish were in effect, the fishermen became very careless in the handling of their products because they were assured of a market and a good price. With increased production and the lifting of price controls, many fishermen were surprised to find that a market no longer existed for poor quality fish and that all but fish in prime condition met buyer resistance.

Recommendations for improvement of the quality of fish are as follows:

(1) Information should be disseminated to explain to fishermen the necessity for early care of perishable products.

(2) Information should be disseminated to fishermen concerning needed improvements in facilities of the fishing vessels. As an example, fish decks should be covered by canvas or other material during summer months. All vessels should be properly insulated to prevent heat leaks and to preserve the ice.

(3) Fishermen should be advised on the proper use of ice and the quantity to be used.

(4) In large trawlers or tuna vessels, refrigeration coils should be installed in the hold to preserve the ice and assist in the preservation of fish on long trips.

(5) Fishermen should be informed concerning the increase of bacteria on the surface of fish caused by contamination with dirty fish boxes and holds, and the effect of this contamination on quality and prices.

(6) Information should be disseminated to fishermen on the approximate time limits fish may be held under various conditions without the advancement of spoilage.

b. Improving Marketing and Distribution Methods

Transportation facilities and marketing services for distribution of fish to rural areas should be greatly improved. Hitherto nearly all marketing efforts have been directed to channeling fishery products to large consuming areas. Rural populations have been neglected because of a lack of transportation services and storage facilities in inland areas. One result of this has been that during periods of very heavy landings of fish, gluts occurred in consuming areas and fish were diverted for use as fertilizer or animal feed, at a loss to the fishermen. Development of inland markets will assure the fishermen of a greater outlet for their product, and, through competitive bidding by rural and urban distributors, a more stable price level should result. Development of rural markets will require:

(1) Establishment of faster train schedules and the use of refrigerated cars.

(2) Establishment of refrigerated truck routes and schedules to areas not serviced by adequate rail connections.

(3) Construction of re-icing stations for truck and rail shipments.

(4) Establishment of agencies within the market organization at larger landing ports to purchase fish for inland areas. Fisheries cooperative or prefectural officials of such areas should coordinate the work of such agencies.

c. Improving Processing and Preservation Facilities

The canning industry in Japan is modern when compared to other preservation industries, such as refrigeration, drying, salting, and curing. This is because Japan entered the canning field fairly recently. In most instances canning methods and facilities are adequate and well situated.

The refrigeration industry, on the other hand, is far below the level of efficiency in the United States. It is very important that leaders of the Japanese fishing industry consider a long range plan for increasing refrigeration facilities and improving the plants and procedures in the various regions of Japan. Since 1945 the Japanese Government has considered petitions from entrepreneurs of the refrigeration industry for any type of construction and in any area. Approval of all this construction would create a surplus in some cases and leave inadequate facilities in others without regard to the over-all refrigeration requirements of Japan. If a plan can be evolved whereby refrigeration requirements of adjacent ports can be combined, the installation of better equipment at lower costs would become possible. It would appear that in the refrigeration field lies the greatest opportunity for improving the preservation facilities for fish in Japan. Fish caught in abundance in some seasons can be frozen for distribution during periods of scarcity, and increased revenue can be obtained which would pay for the refrigeration and leave a reasonable profit for the fisherman. Advice and guidance on this program could be disseminated through an extension service. Recommendations to effect improvement of these conditions are:

- (1) The Fisheries Agency should immediately undertake a survey of all refrigeration equipment existing in Japan and concurrently a survey to determine refrigeration requirements. These surveys should be made with the idea of creating a long-range construction program for meeting the basic requirements of this important industry.

- (2) Instead of a small plant being built in nearly every fishing village in Japan, larger plants should be constructed in central locations to serve several ports. In this way, the latest type of equipment and better facilities could be obtained with the expenditure of the same over-all amount of money.

- (3) Along with increasing the capacity of the refrigeration industry, some thought should be given to increasing the industry's efficiency. Experiment has established the fact that fish frozen slowly are of much lower quality than fish that are sharp frozen. Also it has been established that fish held under temperatures which are too high are of poor quality. Observations on field trips by Natural Resources Section personnel have shown that in almost every instance, storage temperatures are much too high for preserving fish in desirable condition. All refrigeration plant operators pay great care and attention to fish intended for export, but fish intended for domestic consumption are treated in an unsatisfactory manner.

- (4) Information should be obtained on the latest type air-blast freeze and contact freezing methods being used in the United States. At a time when considerable building is required to restore Japan's refrigeration industry, installation of the best type of equipment would be wise.

2. Reducing the Expenses of the Individual Fisherman

Improving Shore Handling Facilities: Nearly every small fishing village in Japan has some type of fish market and landing pier for the use of its fishermen. Fish are shipped from these small villages to larger cities either for local distribution or for transshipment. Much better landing and shipping facilities could be obtained if available funds were used to improve facilities at points which could serve several villages. This would decrease the cost of a particular fishery by removing the necessity for elaborate breakwaters, landing piers, rail sidings, and fish market facilities at every village. The establishment of a market, regardless of size, entails a certain amount of overhead expenses. This overhead must be borne during the entire year regardless of the seasonal variation in the catch. Thus if a small village has a very poor season most of the profits are eaten up by the overhead. If the catch of these villages could be channeled into one large market, considerable savings to the fishermen would be effected. Recommendations to effect improvements are:

(1) The Fisheries Agency should undertake a survey of all official landing ports in Japan, and from the results of the survey should prepare a long-range program for adequate improvements in key fishing ports. Petitions are continually being received from ports in various areas of Japan, asking for the building of breakwaters, docks, piers, rail sidings, and fish processing plants. Without a comprehensive survey intelligent recommendations cannot be made on the most effective use of expenditures in improving fishing port facilities.

(2) Facilities for several villages should be combined, and larger fishing ports that could accommodate more vessels with greater safety and offer far more and better shore facilities should be constructed. While fishermen in nearly every village desire some type of breakwater to protect their vessels and fish processing facilities to create employment and income, the construction of adequate port improvements and shore facilities in every village is not economically practical or possible.

APPENDIX G

IMPROVEMENT OF MANAGEMENT AND SERVICES OF JAPANESE FISHERIES COOPERATIVES

by
Freeman P. Smith

February 1951

1. Purposes of Fisheries Cooperatives

Fisheries cooperatives must be operated as business institutions whose primary function is a better financial return for the labor of the fisherman and a higher standard of living for his family. Only increased income through joint action will hold the cooperatives together, command the support of the membership, and contribute to the over-all economy of Japan.

In developing ways and means of increasing fishermen's profit by decreasing operational expenses, emphasis must be placed upon programs to improve the business operations of fisheries cooperatives. Specifically this should be accomplished in a two phase program:

(a) Improving the business methods and efficiency of cooperatives and federations.

(b) Extending and improving the services performed by cooperatives and federations.

2. Improvement of Business Methods and Efficiency of Cooperatives

In the rapid organization of fisheries cooperatives and federations, necessitated by discontinuance of business operations of fisheries associations as of 15 October 1949 as required by law 1/, many cooperatives were not established on sound business principles and certain failures are to be expected. Cooperative leaders and fishermen have shown a tendency to consider cooperatives as "a way of life" or a social or political club rather than a basic business enterprise aimed at greater profit for the individual fisherman. Furthermore, too little consideration is given as to whether "value received" from investments and purchases will exceed actual expenditures for such purposes. A successful business program requires wise use of capital and basic guidance in the conduct of business affairs.

The caliber of directors and officers of cooperatives as a rule is good, and they have a comprehensive knowledge of the affairs of their organizations. Several individual cooperatives are doing an outstanding

1/ Fisheries Cooperative Association Law, Law No 242 of 1948.

job, and many improvements in business operations as compared with the former associations can be noted. Nevertheless, business procedure in the majority of the cooperatives is generally weak, as evidenced by the following:

(a) Many cooperatives are being operated with too many personnel and excessive overhead expenditures.

(b) Available security, in the form of liens on catch and mortgages on facilities, is not being taken in loaning funds or advancing supplies to members.

(c) Loans apparently are being made without adequate investigation of planned use and possibilities of repayment.

(d) The limited savings of fishermen are not being channeled effectively.

(e) Responsibility for various phases of the business activities often is divided among several directors without proper coordination of the over-all operations.

(f) Membership generally is not informed as to business activities and financial status of the cooperative.

(g) Records are inadequate and not maintained currently.

Similar problems exist in the operations of the general federations of cooperatives. Leaders in the federations must have vision, business ability, and the capacity to plan well and administer efficiently. Their financial programs must be built soundly and expanded to keep pace with growth in volume of business. General federations need a great deal of encouragement and support in carrying out their vital role in the cooperative program.

In considering the above problems, due recognition must be given to the fact that under the noncompetitive, controlled association system in operation for several years prior to the enactment of the Cooperative Law in 1948, little necessity for developing sound business management existed. Several years therefore will be required to develop efficient management and training personnel in a majority of the cooperatives and federations.

The following suggestions and recommendations for improvement of business practices in the cooperatives are made:

(a) The business management of fisheries cooperatives and federations should be studied by responsible prefectural and central

government officials, and a basic training and guidance program for correcting the weak points which have been outlined should be instigated. Such a program could be implemented through a fisheries extension service.

(b) If the program is to succeed, all members of the cooperatives must be informed as to their responsibilities and rights regarding the business operations of their cooperatives. Also, members must understand the responsibilities of the elected directors and of the paid employees of their cooperatives. Therefore, the training program recommended in paragraph (a) should be directed at the entire membership as well as at the cooperative officials and employees.

(c) Obviously directors and officers, however capable, who must make their living through fishing cannot devote sufficient time to business management of the cooperative to insure efficiency. Therefore a paid manager, with full authority to operate within policies laid down by the board of directors, should be employed where potential volume of business and revenue are sufficient. The manager should try to keep personnel and procedures to a minimum essential to efficiency, service, and economy. Maximum service and savings for members must be his first consideration. Where cooperatives have employed efficient managers a marked improvement in operations has been noted.

(d) Operating fund reserves are of utmost importance to cooperatives. Members must be encouraged to increase their capital investment in their cooperatives as well as to participate more fully in service activities in order to establish appropriate reserves permitting sound and efficient operation.

Note: Detailed discussion of the above topic is set forth in an article, "Management of Cooperatives", prepared by Freeman P. Smith, NR/Fi, and reprinted by the Fisheries Agency in the October 1950 issue of "GYOSON".

3. Extension and Improvement of Services Performed by Cooperatives and Federations

In the rapid organization of fisheries cooperatives and federations little consideration was given to economic factors involved or the development of basic service programs. Facilities transferred from the old associations were rather substantial and should go far toward meeting the immediate facility needs of the cooperatives. However, many facilities are not being used to the maximum capacity or in an efficient manner. On the other hand, some cooperatives have started expansion of marketing, handling, and processing facilities without proper consideration of the potential financial returns that can be expected.

The majority of the fisheries cooperatives organized by coastal fishermen immediately developed marketing and purchasing activities.

Many cooperatives operate their own wholesale auction markets, handling from 50 to 100 percent of the catch by their members. Only a few have acted in the capacity of retailer or transshipment agent. The normal practice is to deduct a handling charge of three to five percent from total catch sales. Because of limited operating funds, many cooperatives have been unable to pay fishermen on date of delivery of catch to the market. A delay of 10 to 15 days normally is involved in receiving payment from wholesale agents or buyers. Joint purchasing of materials and supplies has not been too effective in comparison to the total requirements of the membership. Usually such purchases have been on a "pool order" basis, with few cooperatives maintaining any stock of supplies in their warehouse. Purchasing activities declined noticeably after removal of subsidies on certain materials in April 1950. Owing to limited purchasing funds and small volume of orders cooperatives have not been able to obtain appreciable discounts in purchase price. On the other hand many cooperatives advanced supplies to members without obtaining any security or catch liens. Payment by members for such supplies has been slow in many cases, resulting in financial difficulties for the cooperatives.

Each cooperative normally lists information and education service in its program of work. The Cooperative Law requires that a portion of the annual surplus funds be set aside for this purpose because a well-informed membership is the most important asset of any cooperative. However, the manner in which this service is conducted by individual cooperatives generally is ineffective. Membership education and the improvement of the relationship of members to the cooperative must be a continuing program as the need for it never ends and the scope constantly increases with expansion of business activities.

Other services that have been established to a varying degree by cooperatives are: (a) acceptance of members' savings deposits and advancement of short term loans; (b) refrigeration, ice-making, processing and related facilities; (c) boat repair and construction yards; (d) battery recharging stations; (e) welfare facilities such as health centers, hospitals, bath houses, barbershops, etc.

Improvement of services must be based on sound economy and a well-informed membership. In order to increase the fisherman's net return for his labor through improvement and expansion of cooperative service the following steps are recommended:

(a) A study should be made, by spot checking a representative number of cooperatives, to determine the actual status of cooperative service activities as now conducted. A careful review of the service activities of the more successful cooperatives will provide basic data as to where and how specific improvements can be made in many cooperatives for the benefit of members.

(b) Small local cooperatives should be combined, or mutual participation in marketing and purchasing activities should be encouraged, in order to provide a reasonable economic base.

(c) Federations should be reorganized on the basis of common problems, rather than prefectural lines, with emphasis on volume of business and services. The aim should be to build the program on a sound economic base, expanding slowly as experience is gained, capital acquired, and capable management developed. General federations provide the best organization through which cooperatives can develop sufficient business to make them a real factor in servicing the fishing industry.

(d) Fishermen through cooperatives and federations should establish themselves in the marketing field at all levels including the terminal market. Such activity should be well planned and developed step-by-step. Other related services such as processing, refrigeration, and transportation should be advanced with the expansion of the marketing activities.

(e) Purchasing activities also should be expanded by coordinating buying through the federations in order to obtain maximum discounts on material prices to members. Necessary information should be provided cooperatives, through federations, regarding best available sources of supplies.

(f) Fisheries cooperatives should establish and maintain an organized program of savings deposits by members, preferably on the basis of an established percentage of catch sales. Cooperatives also should maintain substantial deposits in banking institutions in order to establish the credit base for financing expansion of services.

Improvement and expansion of health and public welfare services will be dependent upon availability of funds. As marketing and purchasing services will be the chief source of operating funds, health and public welfare services must assume secondary roles.

APPENDIX H

JAPANESE FISHERIES FINANCING AND COOPERATIVE MANAGEMENT

by
Howard H. Gordon
Visiting Expert Consultant 1/

June 1950

1. Purpose of Study

The problem of Japanese fisheries financing and cooperative management to be solved has two main aspects; (a) establishing a sound credit system which will provide essential financing for fishing operations, and (b) strengthening group activities of small-scale coastal fishermen through democratic cooperatives, in order to maximize indigenous production of marine food and to improve the economic and social status of the individual fisherman.

2. Situation for Japanese Fisheries

The approximately 1,000,000 families engaged in fishing provide the people of Japan with 85 percent of their animal protein requirements and more than four percent of the total calories consumed. These families, thickly clustered in some 3,000 villages along Japan's coastlines are near the bottom of the Japanese population in income, education, culture, and opportunities. Also, a sharp increase in the number of fishermen since 1940, reliably estimated at approximately 40 percent, has placed a heavy strain on resources and reduced the return to the individual fisherman.

The national government apparently long has recognized the great variety of natural hazards involved in fishing and in order to promote expansion and safeguard the nation's food supply has indirectly heavily subsidized the fishing industry through unsound and unsecured loans. The need now is for financial, insurance, and management programs designed to meet these problems on a more realistic basis.

A study of the Fisheries Cooperative Association Law (Law No 242 of 1948) indicates that it is based on recognized cooperative principles and is essentially satisfactory as a guide and authority for the development of the various types of cooperatives contemplated.

1/ Extracts from report prepared by Mr Gordon at the end of his tour as visiting expert consultant, Natural Resources Section, 8 May-8 July 1950.

With production largely restored, the industry is now in much better position to undertake a sound cooperative business program. Such a program to be successful requires capital provided on a carefully planned basis and used wisely. Therefore financing must be coupled with guidance in the use of capital and the conduct of the business affairs of the cooperative.

3. Observations on Cooperatives and Federations of Cooperatives

Forty local cooperatives, six general federations, and two credit federations, selected to give a representative cross-section of fisheries cooperatives and federations in Japan, were visited. Observations made on such field trips indicate the following:

a. Japanese fishermen have an extensive background in cooperative effort although this experience has not been along economic lines to any appreciable extent nor has it been of a democratic nature.

b. A lack of full consideration of the economic factors involved is evidenced by a tendency toward small, hastily organized cooperatives.

c. A definite and drastic change in leadership is under way, indicating a determination on the part of the fishermen to control their cooperatives through the election of directors responsive to their wishes and needs.

d. The caliber of directors and officers as a rule is good, as is their knowledge of the affairs of the cooperatives.

e. Business procedure in the cooperatives at all levels is weak in that available security is not being taken for loans and advances of supplies. Many loans apparently are being made without adequate planning as to use of funds and possibilities of repayment.

f. Facilities being transferred from the old associations are frequently substantial and should go far toward meeting the immediate facility needs of the cooperatives. However, many facilities, particularly those devoted to the handling of supplies, are not being used to the maximum.

g. Not enough attention is being devoted to maintenance and appearance of facilities and equipment.

h. The limited savings of fishermen are not being channelled as effectively as they should be. Too many fishermen are depositing their savings with agricultural cooperatives or postal savings without realizing the necessity for building the financial strength of their fisheries cooperatives through their own savings deposit program.

Every effort should be made to correct this situation. The sure way of developing this important phase of the financing program is by members depositing approximately five percent of returns from sale of catch in a cooperative savings deposit.

i. Too great stress cannot be placed on the practical economic aspects of the cooperative program, requiring leadership by experienced, practical men. The supply of such men is limited at present.

j. General federations visited had been organized too recently to develop a very full program of service. Such federations provide the only method through which cooperatives can develop sufficient business to make them a real factor in the business world and enable them to meet big business on equal terms. Leadership in the federations must have vision, business ability, and the capacity to plan well and administer efficiently. Their financial program must be built soundly and keep pace with growth in volume of business. The chief role of the credit federations is that of encouragement of savings by fishermen, and investment of these savings in their own industry as a basis for capital requirements of the fishing industry.

4. General Financing

With the economy of Japan still suffering from the effects of war and the economic upheaval which followed, and with fishermen caught in a squeeze between low prices for their catch and the steadily mounting cost of fishing supplies, financing the fishing industry presents a problem difficult to solve. The wide range in types of fishing, extreme variations in income, natural limitations, and inadequate harbor and transportation facilities necessitates loans ranging from disaster or relief type to long-term loans for facilities.

Discussions with officials of the Central Cooperative Bank for Agriculture and Forestry indicate that both short-term and long-term loans to cooperatives can be handled by the Bank. Some reorganization will be necessary for adequate handling of emergency or relief type loans which should be done on a basis entirely separate from the Bank's regular loaning program, with no intermingling of funds or personnel. Such emergency loans to be effective should be made direct to individual fishermen and not permitted to complicate the finances of the local cooperatives. To be more effective, the staffs of the Central and Branch Banks must include personnel competent to analyze long-term loan applications, determine their soundness, and provide some supervision in the carrying out of the plan of repayment. Inadequate short-term loans as now practiced, with numerous renewals, do not contribute to a strong fishing industry. It is far better to make long-term (up to 10 years) loans where necessary on a conservative basis with realistic repayment schedules. Both short-term and long-term loans should be secured and

used strictly in keeping with good banking practices. Eventual ownership of the Central Cooperative Bank by fishermen and those engaged in forestry and agriculture is a goal to be attained over a period of years. Such a goal requires strict adherence to good banking practice, minimizes dependence on government funds, and necessitates active participation by individual members of cooperatives in the provision of necessary capital.

5. Management and Financing of Local Cooperatives

The real problems in financing fishermen do not seem to be at the Central Cooperative Bank level so much as at the local level. Here the problem is one of developing a basis on which loans can safely be made by the Central Cooperative Bank directly to cooperatives or through federations. The problem at the local level is frequently a lack of potential volume of business sufficient to provide a sound economic base. Where this is true, the cooperatives should not attempt economic functions beyond the pooling of orders for supplies and marketing of catch through their federations. Where local cooperatives have sufficient volume of business to provide an economic base, special attention needs to be given to (a) management, (b) savings deposits, (c) credit, (d) security for loans, and (e) educational program for members.

Based on field observations basic improvement in business management of the cooperatives can be accomplished along the following lines:

- (a) Increased capital through membership stock and savings deposits.
- (b) Acquisition of adequate security in making of loans.
- (c) Sound financial planning and carefully developed loan applications indicating ability to repay within the terms of the loans.
- (d) Build-up of more adequate reserves.
- (e) Fishing supplies provided members only on a cash basis, except where a definite program of deductions from sales returns for catch provides a safe basis for repayment. Failure to absolutely control credit is one of the principal causes of failure in cooperatives.
- (f) Employment of paid management, with full authority to operate within policies laid down by the board of directors. It should be the aim of the manager to keep personnel and procedures to a minimum in the interest of efficiency, service, and economy. Maximum service and savings must be his first consideration.
- (g) Since an informed membership is the most important asset of a cooperative, management must devote much thought and action to a

carefully planned program of membership education and relations. This is a continuing program as the need for it never ends and the scope of it constantly increases.

Note: Mr Gordon included in his report certain other specific recommendations regarding improvement of the business activities of cooperatives and federations and improvement of credit system for fisheries. These have been incorporated with other material on the subject in Appendices G, I, and J.

APPENDIX I

JAPANESE FISHERIES EXTENSION SERVICE PROGRAM

by
Freeman P. Smith

January 1951

Point 4 of the program proposed for Japan's coastal fisheries proposes the establishment of an effective fisheries extension service as a means of helping fishermen increase their earnings and lower their expenses. The present information and guidance channels as operated by the government and local organizations are inadequate to accomplish proper dissemination of needed information to the majority of fishermen. An increasing need is evident for the development of a sound fisheries extension service program that can serve in the capacity of educator and information medium.

An extension service, if properly handled, can be of invaluable assistance in guiding fishermen in improved business methods, marketing procedures, better utilization of cooperative service, improved processing and preservation techniques, conservation of resources, and general improvement of their social and public welfare. However, if such service is not soundly planned and conducted it will not produce results commensurate with its cost to the government. Furthermore, an inefficient program carried out by untrained personnel will not obtain the backing of the fishermen and will discredit the entire project before it becomes firmly established.

Establishment of a fisheries extension service is recommended, provided it is based on a sound general program and initiated in a realistic manner. The program can be inaugurated in a few prefectures with limited funds and expanded as personnel become trained for the work and additional funds become available. The extension service program should be developed as follows:

1. An administrative group should be established within the Fisheries Agency to develop the basic national program. Indications are that such action could be taken immediately within present budget funds and by available personnel. This group should analyze the basic economic problems of the fishing villages through conferences with fisheries leaders, local representatives of fisheries cooperatives and other fisheries groups, and representatives of local and central governments. This analysis would provide the basis for determining the primary projects to be emphasized under the extension service and for setting up clearly defined objectives. To establish a sound program the support of local communities and the industry as a whole is vital.

2. The second step would be the development, at the central government level, of the basic program, using the information obtained from the analysis recommended in paragraph 1. A proper balance between technical information based on research work and the broader economic and social problems must be maintained in the program. The following national level projects are suggested, in order of preference, for inauguration of the extension service:

a. Improvement of the business management of fisheries co-operatives and increasing their service to the members. The aim should be to promote the general improvement of the fishermen's financial condition through more and better services to the individual fisherman, which will reduce the costs of materials and of handling his catch.

b. Guidance in preparing and filing income tax returns under the revised tax laws, and advice on record keeping for income tax and other purposes.

c. Education and guidance in conservation of resources through proper regulation and management based on scientific research.

d. Methods of improving the processing, handling, and sale of the catch. This will include such items as refrigeration, marketing techniques to preserve quality and obtain higher prices, and market price information.

e. Proper use and conservation of fishing materials and equipment, such as preservation of nets, drying of nets in yards protected from the sun, and proper maintenance and repair of fishing boats.

f. Dissemination of information regarding pertinent laws and regulations affecting the fishing industry.

g. Improvement of general social and public welfare of fishing villages. Methods of effecting adjustments to meet changing economic conditions must be considered.

h. Improvement of production activities through adaptation of new fishing methods and gear, collective group operation, and improved propagation methods and practices in inland water fisheries.

3. Concurrently with the finalization of the national program set forth in paragraph 2, consideration should be given to formalizing the extension service through legislative action. Such enabling legislation should define the objectives of the service and provide for the administrative organization, method of financing, employment standards, and other aspects. The following suggestions apply to the administrative organization:

a. Establish a special Extension Service Section within the Fisheries Agency.

b. Employ a very limited Section staff to provide general supervision and administration of the program.

c. Employ two to three field agents in selected prefectures, who should maintain close liaison with production and research personnel.

d. Vest administrative control of the Extension Service Section in the Administrative Department of Fisheries Agency owing to the broad aspects of the program. Field agents should be placed under direct supervision of prefectural fisheries section chiefs, to permit proper coordination of research, production, and administrative informational projects in the local extension program.

e. Consider the appointment of advisory councils at national and local levels (as used in the agricultural extension program), but this point is not deemed essential to the program.

4. Following the enactment of the necessary enabling legislation, field agents should be established in selected prefectures to develop local programs. Such agents, with supervisory assistance of the Extension Service Section, and after consultation with local fisheries groups, should develop the local program along the lines of the national program. Emphasis on specific projects should vary to meet the local needs and conditions. Expansion of the field of operation to additional prefectures and employment of additional agents should proceed in an orderly manner as qualified personnel and funds become available.

5. Other factors must be given careful consideration in the establishment of an efficient extension service, as follows:

a. The qualifications and method of selection of supervisory and field personnel are of vital importance. Lack of experienced personnel or those with extension service type background is a major reason for restricting the number of employees to a minimum during the development stage of the program.

b. Definite plans should be made for training of supervisory and field agent personnel. Such plans should include these points:

(1) Frequent conferences between supervisory and research personnel and field agents should be held.

(2) Conferences between field agents should be arranged, to permit an exchange of ideas and techniques.

(3) As soon as field agents become established in selected prefectures, new field agents should be required to work as assistants under the experienced agents for a minimum of six months in actual "on-the-job" training.

(4) Arrangements should be made with universities and fisheries colleges to give special courses on such topics as co-operative management, business management, techniques of developing community activities, and methods of demonstrating results of experimental work.

c. Careful consideration should be given to the information and instructional material to be provided field agents. The selection and preparation of such material will be largely the responsibility of the personnel at the central government level. Actual presentation to the fishermen must be in simple everyday language. The field agent should implement his local program chiefly through group discussion and group participation rather than by individual contacts. Close liaison with and use of fisheries cooperatives must be emphasized. However, as time permits, instruction to individual fishermen on better business management regarding record keeping, proper use of credit resources, supervision of debt repayments, etc, should be a corollary action.

APPENDIX J

FINANCING THE JAPANESE FISHING INDUSTRY

by
William C. Herrington

December 1950

1. Financial Condition of Japanese Fisheries

During the past year investigations of the economic conditions of Japanese fisheries by Natural Resources Section personnel have increasingly shown that most of the industry is now facing a financial crisis. This condition is especially severe in the coastal fisheries which account for the bulk of the industry's production. Unless these financial problems are overcome the present upward trend of production will be reversed and many fishermen and cooperatives will be forced out of business.

A combination of factors is responsible for the present unfavorable financial condition of fisheries. Some of the more important of these factors are:

a. Lack of adequate reserves for operating expenses owing to the large expenditures required to replace facilities and equipment lost or damaged during the war years. The inflation and high taxes also contributed to the present shortage of reserve funds.

b. A marked decrease in the catch per individual unit despite the fact that present production compares favorably with prewar production in the same area. The number of fishermen has increased by 30 to 50 percent since the Surrender.

c. A sharp increase in operating expenses owing to doubling and tripling of prices for fishing materials since removal of government subsidies in April 1950.

d. A decrease in the producer price of fish resulting from improvement in the over-all food supply situation during the past year. Lack of experience in selling on a free market, resulting in inefficient marketing, temporarily has contributed to the decrease in price since decontrol in April 1950.

The many types of fishing, extreme variations in seasonal and annual income, fluctuations in catch, vulnerability to disaster, and shortage of transportation and handling facilities necessitate financing

which ranges from disaster relief grants and short-term operating loans to medium- and long-term loans for facilities, boat construction, harbor repairs, and similar expenditures.

2. Credit Needs and Problems

A more adequate and realistic credit system is needed to enable the fishermen to maintain or increase production. It is vital to the fishing industry that credit at reasonable rates of interest and rational repayment terms be made available for operating expenses and repair, remodeling, construction of warehousing, refrigeration, processing facilities, marketing facilities, and boats and harbor facilities.

At present the Central Cooperative Bank for Agriculture and Forestry is the chief source of credit for the fishermen. In addition local banks and financing groups provide a small percentage of the total requirements. Cooperatives and federations of cooperatives serve as the medium through which the loans are processed. Current policy restricts practically all loans to short-term (one year or less) regardless of the purpose or use to be made of the funds. Even for the construction of harbor and port facilities, processing, handling, or market facilities, or for acquiring such facilities from former associations, loan funds have generally been available only on a six-month to one-year term. The physical nature of such property and the prospective income from facilities being purchased or constructed and available for security should logically permit 5 and 10 year loans. Restriction to short-term loans has necessitated constant renewal, excessive administrative costs on the part of loaning institutions, and loss of credit resources through unavoidable delinquencies. As the margin of profit in fisheries has decreased, loaning institutions have become more and more skeptical of making loans to fishermen, even for seasonal operations.

The excessive interest rates required by present loaning institutions result in extreme hardship and numerous delinquencies by fishermen. The operational margin of 4 or 5 percent or more used by financial institutions does not appear justified. Interest rates paid on term savings deposits normally average 3 1/2 to 4 percent while interest rates charged on loans are 9 to 10 percent for short-term and 10 to 15 percent on long-term (over one year). Furthermore, interest rates are the same within the two general categories regardless of the risk involved in the enterprise, available security, or repayment plan. Such practice has handicapped the borrower of sound low-risk investment funds in that he must pay interest rates high enough to meet deficits developed from loans to high-risk and questionable enterprises.

Most of the loans made in the past to fisheries associations, and now being made to cooperatives, by the Central Cooperative Bank are on an "unsecured" basis. Available security in the form of liens on catch and mortgages on facilities has not been obtained. Such handling

of loans has resulted in unwarranted delinquencies and in general has weakened the entire credit system in fisheries.

Financing needs of fishermen and processors may be grouped in the following categories:

a. Short-term (up to one year): seasonal and annual operational expenditures for supplies and equipment, fish handling, and marketing.

b. Medium-term (1 to 10 years): boat construction and conversion; construction or purchase of processing, cold storage, warehouse and marketing facilities, fish culture facilities, and shore installations such as net drying and boat landings.

c. Long-term (over 10 years): building and repair of fishing ports and harbor installations.

d. Disaster and relief: repair of damages and replacement of losses resulting from typhoon and other natural disasters; reclamation of damaged fishing grounds; repatriation settlers' projects; development of new fishing grounds.

Funds required by cooperatives and federations for the above financing during last half of the 1950 fiscal year ^{1/} and for the 1951 fiscal year have been estimated by the Fisheries Agency, Ministry of Agriculture and Forestry, on the basis of reports from prefectural credit federations as follows:

FUNDS NEEDED FOR FISHERIES FINANCING
(¥1,000)

Term	Amount	
	Last Half 1950 FY	1951 FY
Short-term (up to 1 year)	2,285,600	4,488,000
Medium-term (1 to 10 years)	2,436,000	6,387,000
Long-term (over 10 years)	220,000	507,000
Disaster and relief type	150,000	275,000
TOTAL	6,091,600	11,657,000

The above amount for medium-term loans does not include approximately four billion yen necessary for capitalization of the fixed assets which the fisheries cooperatives have or will obtain by transfer from the former fisheries associations during 1950 and 1951, including certain necessary refinancing. Of the total loan requirements it is estimated approximately 20 percent may be obtainable from local credit sources.

^{1/} Japanese fiscal year, 1 Apr 50-31 Mar 51.

Two alternative plans of establishment of adequate credit at the national level might be considered; (a) reorganization of administrative operations and expansion of resources of the Central Cooperative Bank for Agriculture and Forestry to meet approximately 80 percent of total needs for short-term and medium-term loans; or (b) establishment of a new banking facility to handle all types of fisheries loans, not available from present local sources at reasonable interest rates. Either of the above plans will require the support of the government in making available necessary capital at low interest rates from such funds as the Special Deposit Account, US Counterpart Aid Fund Special Account, and direct government subsidies.

Disaster and relief type financing should be made available by direct government appropriations, largely in the form of rehabilitation grants. Such assistance should be made direct to the individual fisherman and not handled through the cooperatives. Preferably such financing should not be handled through either of the banking facilities proposed in the preceding paragraph but by a separate governmental agency. If the regular banking facility is used, a special department should be established to handle relief and disaster type loans and grants, with its funds and activities completely segregated from the normal lending functions of the bank.

Fisheries specialists in Natural Resources Section are of the opinion that the Central Cooperative Bank for Agriculture and Forestry can adequately handle the normal credit functions of the fishing industry for short-term, medium-term, and long-term loans if the present policy on terms of loans is changed and certain internal reorganization of operations is carried out. These points include:

a. The bank should reorganize its program and operate in accordance with sound cooperative banking principles.

b. Competent personnel should be included on the staffs of the Central Bank and its Branch Banks, capable of analyzing loan applications to determine their soundness, render assistance in coordinating short-term and long-term financing as to repayment schedules, and supervising to some extent the carrying out of repayment plans.

c. In the making of medium- and long-term loans, the Bank should consider security based on stabilized values rather than inflated values, with provision for refinancing during inflationary periods, and loan funds restricted to a reasonable percentage of total requirements, thereby eliminating loans of extremely high risk. Repayment schedules must be in line with the prospective income and service life of the facility or equipment being financed. However, repayment should be made as rapidly as a carefully prepared and analyzed plan indicates is feasible.

d. Proper consideration should be given to requiring available security on loans advanced. Such security is available on short-term

loans in the form of catch liens and assignment of specified percentage of catch sales. On medium- and long-term loans for facilities, security in the form of mortgages on the facilities to be purchased or constructed, and other facilities owned by the borrower, is available.

e. Reduction of average interest rates to not more than 7 1/2 percent on short-term loans and 8 percent on long-term loans by decreasing administrative costs, furnishing government assistance in providing capital resources (thereby eliminating the necessity of payment of high interest on debentures), and increasing deposits by prospective borrowers. Temporary subsidization of interest rates by the government may be necessary to provide fishermen with credit at interest rates within their ability to pay.

f. Segregation of loans into categories ranging from "well secured" to "very high risk" loans should be established with varying rates of interest (from 5 percent on "well secured" to 12 percent on "very high risk"), with total returns sufficient to meet the average rates noted in paragraph (e).

g. Under present capitalization and lending practices of the Bank, the fisheries industry has been able to obtain loans annually in the amount of approximately five billion yen. To meet the over-all fisheries credit needs, less 20 percent to be obtained from local sources, credit by the Bank should be made available in the amount of approximately 12 billion yen annually. This will require an increase in present capitalization for fisheries only of approximately two billion yen, or a comparable shift made from presently allocated funds of agriculture and forestry credit. Restrictions on total capitalization should be flexible enough to permit such adjustments.

If the Central Cooperative Bank cannot be reorganized along the lines outlined, a separate government-supported banking facility should be established immediately for the fishing industry. Such facility should handle all types of loans necessary except disaster and relief financing. Capitalization of a separate central financial institution cannot be obtained from the fishing industry alone; government participation will be required. Administrative activities should be patterned after those recommended for the Central Cooperative Bank.

Financing of short-term to long-term loans should be under the same administration in order to insure proper repayment schedules and utilization of loan funds. The establishment of a separate banking institution will require the transfer of current stock and outstanding obligations held by fisheries groups in the Central Bank to the new institution.

3. Recommendations

a. The Central Coöperative Bank for Agriculture and Forestry should reorganize its administrative operations to conform with sound co-operative banking principles and change its policy regarding terms of loans to meet the needs of the fishing industry. The reorganization should include the providing of staff personnel with experience in fisheries operations and competent to analyze loan applications as to soundness and to provide some supervision to borrowers in carrying out a coordinated plan of repayment.

b. If the Cooperative Bank cannot be reorganized in accordance with paragraph a, a financing institution should be established for fisheries. If a separate bank is established, provisions should be made for short-term, medium-term, and long-term loans which must be coordinated to insure realistic repayment schedules and proper utilization of loan funds.

c. Interest rates should be established on the basis of a varying scale according to soundness of loan or risk involved, with the overall average rates not to exceed 7 1/2 percent on short-term loans and 8 percent on medium- and long-term loans.

d. Disaster and relief type financing should be made available by direct government appropriation in accordance with actual need. Administration of such funds should not be under the general lending institution but under a separate government agency. Financing of this type should be made direct to individual fishermen.

e. Loans to cooperatives and federations should be made on the basis of the following:

(1) Analysis of loan application by qualified personnel indicates soundness of loan.

(2) Repayment is scheduled in accordance with the prospective income from the facility or enterprise and life of the facility, equipment, or materials being financed, and after thorough analysis of all outstanding obligations to be met.

(3) Available security should be taken in the form of catch liens and assignment of sales for short-term loans and as mortgages on facilities for medium- and long-term loans.

(4) Medium- and long-term loans should be based on stabilized security values with provision for refinancing during an inflationary period.

(5) Cooperatives receiving loans should be required to submit regular and adequate financial statements, with annual audits by independent auditors.

(6) Restrictions regarding maximum capitalization of the banking institution should be sufficiently flexible to meet current normal needs of fisheries.

